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NEWS AND VIEWS

We have great pleasure in welcoming to the editorial panel Mr. M. W. F. Tweedie, who has recently retired from the Raffles Museum in Singapore, of which institution he was Director.

Binding. Binding of the volume for 1957, or for any previous volumes can still be undertaken. The standard binding is in dark blue cloth, but any other style can be followed. The current cost per volume for binding in normal style is 15s., but we must reserve the right to alter this owing to the present tendency of rising costs. Volumes for binding should be sent to E. W. Classey, 22 Harlington Road East, Feltham, Middlesex.

PELMATOSILPHA MARGINALIS (BRUNNER) IN MIDDLESEX (DICTYOPTERA: BLATTIDAE)

I am indebted to Mr. E. W. Classey for a fine female specimen of *Pelmatosilpha marginalis* (Brunn.) taken in a fruiterer's shop at Feltham, Middlesex, 10th November, 1957.

A. E. GARDNER.

29 Glenfield Road,
Banstead, Surrey.

BOOK REVIEW

Fauna d'Italia. Vol. I. Odonata, 1956, by Cesare Conci and Cesare Nielsen. 298+12 pp., 156 figs., many compound. Paper covers, Bologna. Price £2 2s.

Professor Conci and Dr. Nielsen in describing the Italian Odonata in the first volume dealing with the Italian fauna issued under the auspices of the National Academy of Entomology and the Italian Zoological Union have set a high standard which will be difficult to surpass.

Concise, extremely well and profusely illustrated, this work will be found most acceptable to all Odonatists interested in the many species found in the diverse types of Italian habitats and those of the surrounding islands.

The nomenclature adopted is as usually used by our continental friends, but the authors have not been too dogmatic and have provided footnotes in which alternative nomenclature is discussed. Divided into three parts, the first 35 pages are devoted to the morphology of the adult insects and the larvae. The early stages are briefly described adequately however in a work mainly dealing with the systematics. This is followed by a table of the 80 recorded species, their distribution given by provinces and islands, geographical origins are enumerated, and finally there is a short chapter on collecting and the preservation of material.

Part II deals with the systematics of the imagines and runs to 150 pages, keys being provided down to specific level. Each species (and those likely to be taken in Italy) is provided with a list of synonyms, dimensions of both sexes, the type locality and geographical distribution. The numerous and clear illustrations enabling identifications to be made even if the student does not understand the Italian language. Two new subspecies are described—*Calopteryx* (*Agrion*) *virgo padana* Conci from Trentino, Lappio and Rio Cameras, and *Calopteryx* (*Agrion*) *splendens capaai* Conci from Mantova and Bosco Fontana.

In Part III nearly 80 pages are devoted to keys and descriptions of the adult larvae, these supplemented by numerous line drawings. I am of the opinion that too much reliance has been placed in the keys on the labial and premental setae. These frequently vary in number and overlap in many closely related species, whereas more obscure characters often provide more reliable characters for their separation. Several illustrations of entire larvae do not come up to the high standard of the majority of the drawings. The bibliography runs to thirteen pages, a specific index is provided, and the front cover is attractively illustrated in colour with the handsome *Cordulegaster boltoni.*

In presenting for the first time a book devoted entirely to the Italian dragonflies the authors are to be congratulated on a work representing a great deal of patient and efficient study.

A. E. GARDNER.

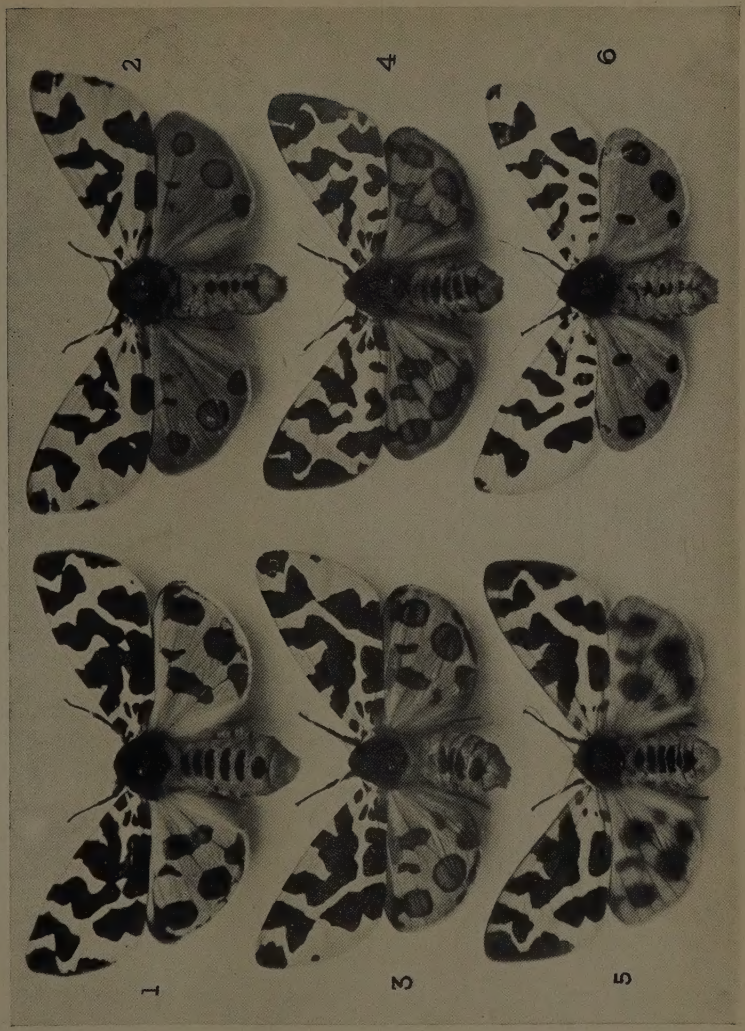


Photo by W. E. Ashworth

ABERRATIONS OF *ARCTIA CAJA* (L.)

1. Ab. *leucorhabda* Gordon Smith
2. Ab. *olivaceosuffusa* Gordon Smith
3. Ab. *fuscorhabda* Gordon Smith
4. Ab. *paliscia* Gordon Smith
5. Ab. *catarryta* Gordon Smith
6. Ab. *tigrina* Gordon Smith

NEW ABERRATIONS OF *ARCTIA CAJA* (LINN.) (LEP: ARCTIIDAE)

By S. GORDON SMITH, F.L.S., F.R.E.S.

In the *Entomologist's Gazette,* 1957, **8** (2): 90-92, several new aberrations of *Arctia caja* were recorded; I now have eighteen more specimens which appear worthy of being described and named.

Arctia caja ab. **leucorhabda** ab. nov.

Forewing with fairly heavy clove-brown markings on cartridge-buff: hindwing yellow suffused with scarlet, black markings fairly heavy, the bluish sheen evanescent: costa broadly silvery-grey.

Type: Female bred 11.4.1957. Yorkshire x (Chester x Hants. x Norfolk).

Plate I. Fig. 1.

Arctia caja ab. **olivaceosuffusa** ab. nov.

Forewing dark markings less extensive than light markings, which are degraded with light brownish olive: hindwing deep vinaceous overlaid with light brownish olive; the dark markings all separate black spots.

Type: Female bred July, 1956. Chester x (Hants. x Norfolk).

Plate I. Fig. 2.

Arctia caja ab. **fuscorhabda** ab. nov.

Forewing very similar to Plate I. Fig. 2. The light markings slightly degraded with light brownish olive, hindwing deep vinaceous overlaid with brownish olive, the costa glossy fuscous-black.

Type: Female bred 23.10.1955. F2 generation, Hants. x Norfolk.

Plate I. Fig. 3.

Arctia caja ab. **paliscia** ab. nov.

Forewing with the light markings degraded with light brownish-olive, the hindwing purplish vinaceous, slightly degraded, the black spots mostly linked together, and having a purplish sheen.

Type: Female bred 2.12.1956. Chester x (Hants. x Norfolk).

Plate I. Fig. 4.

Arctia caja ab. **catarryta** ab. nov.

Forewing normal except for a slight degrading of the light markings; hindwing buff-pink, the dark spots ample in size but lacking intensity of pigment, having the appearance of the dark colour 'running' into the lighter.

Type: Female bred 26.2.1957. F3 generation, Tring.

Plate I. Fig. 5.

Arctia caja ab. **tigrina** ab. nov.

Forewing with the cream colour predominating, the clove brown dark markings broken up into 13 bars or spots, giving a tiger-stripe

effect; hindwing not abnormal in colour, the black spots of medium size, discocellular spot wanting.

Type: Female bred 11.4.1957. Yorkshire x (Chester x Hants. x Norfolk).

Plate I. Fig. 6.

Arctia caja ab. **astramenisca** ab. nov.

Forewing markings ordinary except that the inner marginal quadrate mark consists of a semicircular mark on the inner margin, its arms costad and embracing a prominent spot of the same colour, the lighter markings degraded slightly; hindwing deep vinaceous with the usual black markings.

Type: Female bred 8.12.1956. Chester x (Hants. x Norfolk).

Plate II. Fig. 1.

Arctia caja ab. **s-signatum** ab. nov.

Forewing. The chief characteristic of this aberration is in the outermost component of the triple costal mark which is shaped like a letter S.

In colour this specimen is similar to ab. *nigrata.*

Type: Female bred 18.6.1957. Norfolk x (Hants. x Chester).

Plate II. Fig. 2.

Arctia caja ab. **lamprogenys** ab. nov.

Forewing of this aberration is characterized by the feature of the dark clove-brown markings being outlined by colour lighter than the infuscate light markings; the hindwing has a vinaceous ground almost obliterated by fuscous suffusion. This specimen exhibits the forewing shape seen in ab. *povevi.*

Type: Female bred 5.10.1956. F2 generation, Chester x (Hants. x Norfolk).

Plate II. Fig. 3.

Arctia caja ab. **ditta** ab. nov.

Forewing dark markings not very deeply coloured, the light markings heavily infuscate; hindwing vinaceous pink ground-colour dominated by fuscous suffusion, medial and cubital spots only present, small.

Type: Male bred 1.3.1956. F2 generation, Chester x (Hants. x Norfolk).

Plate II. Fig. 4.

Arctia caja ab. **osta** ab. nov.

Forewing with the triple costal mark joining the upper part of the subterminal band, the inner marginal quadrate mark has either vanished or coalesced with the cottage-loaf half of the subterminal band, colours near normal, slightly degraded.

Type: Male bred 26.9.1956. F2 generation, Yorks. x (Chester x Hants. x Norfolk).

Plate II. Fig. 5.

Photo by W. E. Ashwor

ABERRATIONS OF *ARCTIA CAJA* (L.)

1. Ab. *astramenisca* Gordon Smith
2. Ab. *s-signatum* Gordon Smith
3. Ab. *lamprogenys* Gordon Smith
4. Ab. *ditta* Gordon Smith
5. Ab. *osta* Gordon Smith
6. Ab. *pentapunctata* Gordon Smith

Arctia caja ab. **pentapunctata** ab. nov.

Small, forewing cold sooty black showing signs of weak scaling over a large portion of the wing; there are five cartridge buff markings at about regular intervals from the base along the costa; hindwing about normal.

Type: Female bred 1.7.1957. F2 generation, Norfolk x (Hants. x Chester).

Plate II. Fig. 6.

Arctia caja ab. **aphenges** ab. nov.

Forewing dark markings almost black and predominating over the almost white light markings; hindwing light ochraceous buff, almost obliterated by drab to fuscous suffusion except in the middle of the wing.

Type: Male bred 8.2.1957. Chester x (Hants. x Norfolk).

Plate III. Fig. 1.

Arctia caja ab. **pelodes** ab. nov.

Small, forewing dark markings sepia, light markings slightly degraded with fuscous; hindwing slightly degraded light ochraceous buff, the spots black with obsolescent sheen.

Type: Female bred 18.2.1957. F2 generation, Chester x (Hants. x Norfolk).

Plate III. Fig. 2.

Arctia caja ab. **flavirosea** ab. nov.

Small, forewing dark markings, clove-brown predominating over almost white light markings; hindwing with pattern as shown in the figure, the colour of the light part being orange with a slight tinge basad of scarlet.

Type: Male bred 29.1.1957. F3 generation, Yorks. x (Chester x Hants. x Norfolk).

Plate III. Fig. 3.

Arctia caja ab. **melanolimbata** ab. nov.

Small, forewing dark markings clove-brown, more extensive than the fuscous degraded whitish markings; hindwing light ochraceous buff, broadly margined with black in the manner shown in the figure.

Type: Male bred 8.2.1957. F2 generation, Chester x (Hants. x Norfolk).

Plate III. Fig. 4.

Arctia caja ab. **prosopia** ab. nov.

Small, forewing dark markings warm sepia disposed to display a mask-like effect; hindwing grenadine with orange-buff fringe.

Type: Male bred 20.12.1956. F3 generation, Chester x (Hants. x Norfolk).

Plate III. Fig. 5.

Arctia caja ab. **exotica** ab. nov.

Colour somewhat less bright than in normal *caja*, the underside

exhibiting a much greater distribution of the scarlet tinge; the aberration is further characterized by the fact that the veins are edged on each side by light buff scales, a condition more pronounced on the underside than on the upper.

Type: Male bred 10.7.1956. Yorks. x (Chester x Hants. x Norfolk). Plate III. Fig. 6.

All the above specimens have been bred by me and are in my collection.

ACKNOWLEDGEMENT

My grateful thanks to Mr. W. H. T. Tams for his valuable assistance in describing and naming these aberrations.

PAMMENE AURANTIANA (STGDR.) IN HAMPSHIRE (LEP: TORTRICIDAE)

It may be of interest to report the occurrence of two examples of *Pammene aurantiana* (Stdgr.) in Hampshire. I understand from Mr. J. D. Bradley, F.R.E.S., to whom I am indebted for their identification, that the species has only recently been recognized as British. The first was beaten out of briar by Mr. L. Watson, of 37 Picton Street, Leek, Staffs., in the New Forest on the 8th July, 1957. The second I captured when beating the branches of trees in a lane at Hurn on the 13th of that month. Both specimens were in fresh condition.

R. G. WARREN.

Wood Ridings,
32 Whitmore Road,
Trentham, Staffs.

AMATHES DITRAPEZIUM (BORKH.) IN STAFFORDSHIRE (LEP: AGROTIDAE)

On 18th August, 1956, after a day of rain and strong winds, a rather battered example of *Amathes ditrapezium* (Borkh.) came to light in the porch of my house. This was a new record for Staffordshire and it seems of interest in view of the records for Middlesex and Dublin reported in *Ent. Gaz.* for July, 1957. Three new county records within a month in such widely separated places suggest the possibility of a large-scale migration, and it would be interesting to know if there were any other exceptional occurrences of this species in 1956.

R. G. WARREN.

Wood Ridings,
32 Whitmore Road,
Trentham, Staffs.

Photo by W. E. Ash

ABERRATIONS OF *ARCTIA CAJA* (L.)

1. Ab. *aphenges* Gordcn Smith
2. Ab. *pelodes* Gordon Smith
3. Ab. *flavirosea* Gordon Smith
4. Ab. *melanolimbata* Gordon Smith
5. Ab. *prosopia* Gordon Smith
6. Ab. *exotica* Gordon Smith

THE BRITISH SPECIES OF THE GENUS OXYETHIRA (TRICHOPTERA: HYDROPTILIDAE)

By D. E. KIMMINS

Department of Entomology, British Museum (Nat. Hist.)

Shortly before his death, Mr. M. E. Mosely told me that he was not satisfied with his account of the genus *Oxyethira* in his handbook of the British Caddis Flies, and that he had discovered some inaccuracies in the descriptions. By that time, however, his eyesight was no longer good enough to deal with the minute structures of the Hydroptilidae and he proceeded no further in the matter. Since then new preparations of the male genitalia have been made which have confirmed his view that there were errors in the interpretation of the genitalia. In the males, especially in fluid material, one can often make out sufficient of the structure for identification without clearing the abdomen in caustic potash solution. In doubtful cases, and certainly in the females, clearing will be necessary to reveal the genital structures sufficiently. All the present figures have been made by camera lucida from specimens so treated, and examined in glycerine under a ⅛ in. objective and a No. 4 ocular.

♂ Genitalia (Fig. 4). Seventh sternite with a short, acute ventral process. Eighth segment with tergite and sternite more or less fused, apical margins dorsally and ventrally often excised, apical margin of tergite often with dorsal or lateral processes, the latter sometimes armed with stout spines. Ninth segment largely withdrawn within the eighth, its upper half generally much shorter than the lower, often reduced to a short, transverse band. Lateral apical margins sometimes produced, or armed with variously-formed spiniform processes. Ventral margin generally excised and with a produced lobe arising from the excision, differing in form according to species. Tenth segment obscure, membranous. Aedeagus long and slender, with a spiniform titillator arising before the middle and coiled in a spiral around the aedeagus. Below the aedeagus and attached to the ninth segment are two sclerotized plates, fused at their bases, their apices variously hooked downwards. These plates probably represent the fused claspers. In Mosely's descriptions of *Oxyethira* these plates are termed the lower penis-cover. Above the claspers and arising from them are two pairs of short, membranous processes, each terminating in a seta. Being almost transparent, they are difficult to discern in a balsam preparation.

♀ Genitalia (Fig. 4). Sixth sternite with a short, acute ventral process. Seventh segment with tergite and sternite more or less fused, ventral apical margin sometimes excised. Eighth tergite reduced to a narrow, arched band, centre of its apical margin more or less

produced in a spatulate lobe. Eighth sternite forming a short subgenital plate. Ninth tergite either free or fused to eighth, short and hood-like. Tenth tergite forming a short, broad plate, carrying two slender cerci. Vaginal structures rather obscure as to detail, but apparently comprising an upper and a lower lobe, the latter with a conspicuous process ventrally at the base, directed caudad. Although the details of the vaginal structure are obscure, the general shape as seen in a cleared preparation appears to offer useful characters for diagnosis, as will be seen on examination of the figures, although I do not propose to attempt a description. The form of the eighth to tenth tergites also appears to be of diagnostic value.

Before giving the key to the British species of *Oxyethira,* this opportunity is taken of making some comments on the genus *Oxytrichia* Mosely. This was described in the Handbook (1939, p. 289) to take *Oxyethira mirabilis* Morton and *O. bidentata* Mosely (Argentine). The venational character used by Mosely to separate it from *Oxyethira* (M_3 and M_4 fused in the fore wing) has been found to be based on a misconception of the wing in *Oxyethira.* Mosely has copied McLachlan in showing *Oxyethira* with these veins separate in the fore wing, but McLachlan's figure would appear to be inaccurate or based on an aberration. I have seen no British examples of the typical species *O. mirabilis,* and in spite of the similarity of the venation, I propose to retain *Oxytrichia* as distinct, using as a character the long curved spines projecting caudad from the upper basal margin of the ninth segment (concealed within the eighth). When someone undertakes a comprehensive study of the genus *Oxyethira* and its allies will be a better time to decide whether *Oxytrichia* is worthy of generic rank.

Key to species of Oxyethira (female of *distinctella* not known)

1 Males 2
– Females 8
2 Side-pieces of ninth segment produced in spiniform processes (Figs. 1-2) 3
– Side-pieces not produced in spiniform processes 5
3 Eighth segment with long, slender processes directed caudad (Fig. 2F) 4
– Eighth segment without such processes (Fig 1) ..... *tristella* Klapálek
4 Lateral processes of ninth segment from above straight, not incurved (Fig. 2E) ..... *distinctella* McLachlan
– Lateral processes from above and side sinuous (Fig. 2A, B) ..... *sagittifera* Ris
5 Lateral apical margins of eighth segment rounded, not hooked inwards nor armed with stout black spines (Fig 3) ..... *simplex* Ris
– Lateral apical margins of eighth segment either hooked

inwards (Fig. 4) or armed with strong black spines (Figs. 5-6) 6

6 Lateral margins of eighth segment strongly hooked inwards (Fig. 4) ..... *costalis* (Curtis)

– Lateral margins of eighth segment with strong black spines (Figs. 5-6) 7

7 Produced ventral margin of ninth segment from beneath bifurcate (Fig. 5) ..... *frici* Klapálek

– Produced ventral margin of ninth segment from beneath trilobed, centre lobe largest (Fig. 6) ..... *falcata* Morton

8 Ninth tergite not fused to eighth. Vaginal structure elongate-oval from beneath (Fig. 2) ..... *sagittifera* Ris

– Ninth tergite more or less fused to eighth. Vaginal structure broad-oval or quadrate 9

9 Eighth tergite in side-view produced in a distinct spatulate lobe, above the base of ninth (Figs. 4, 6) 10

– Eighth tergite not so produced 11

10 Seventh sternite with apical margin widely and deeply excised. Eighth sternite bearing two pigmented 'inverted comma' marks (Fig. 6) ..... *falcata* Morton

– Seventh sternite with apical margin straight. No 'inverted comma' marks on eighth sternite (Fig. 4) ... *costalis* (Curtis)

11 Eighth sternite with a small, median, sclerotized cavity (Fig. 1) ..... *tristella* Klapálek

– Eighth sternite without such cavity 12

12 Ventral process of vaginal structure truncate from beneath. Apodeme of eighth tergite forming a right angle with segment in side-view (Fig. 5) ..... *frici* Klapálek

– Ventral process of vaginal structure from beneath pointed. Apodeme of eighth segment forming a very obtuse angle with the segment in side-view (Fig. 5) ..... *simplex* Ris

Oxyethira tristella Klapálek (Fig. 1)

♂ Genitalia. Eighth sternite excised at its apex. Ninth segment long ventrally but reduced to a narrow transverse band dorsally. Lateral apical margins from the side produced and rounded, and with a stout, incurved, acute hook arising from them shortly before the apex. From beneath, the centre of the apical margin terminates in a spatulate lobe, rather thick in side view and above it are two stout, blackened, slightly up-curved hooks. On either side of this median structure is a deep, narrow, membranous excision. Aedeagus long, slender, with a central duct, the single titillator spirally coiled around the stem. Claspers fused to form a sclerotized plate, its apex produced in two strong, down-curved, pigmented hooks, in ventral view approximated, and above them are two pairs of transparent processes, each with a terminal bristle, the upper pair bulbous, the lower smaller and digitate.

♀ Genitalia. Seventh sternite widely excised. Eighth and ninth tergites completely fused, the eighth not produced in a spatulate lobe. Tenth segment forming a short, broad plate, apical margin a truncated triangle. Eighth sternite with a small sclerotized pocket in the centre of its ventral surface, its opening caudad. Vaginal structure short and broad, ventral process with its apex slightly dilated and rounded.

Rivers and lakes, May to September.

Dorset, Hants, Oxon., Wigtownshire, Inverness, Galway. I have taken this species only on a slow stream, Moore's River, near Tricketts Cross, on the Hants-Dorset border.

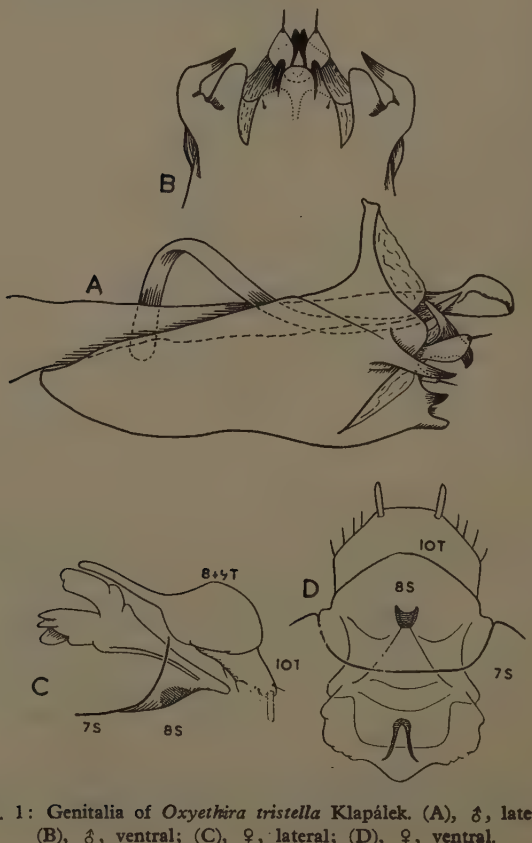


Fig. 1: Genitalia of *Oxyethira tristella* Klapálek. (A), ♂, lateral; (B), ♂, ventral; (C), ♀, lateral; (D), ♀, ventral.

Oxyethira sagittifera Ris (Fig. 2)

♂ Genitalia. Eighth segment fused into a ring, lower apical angle of tergite produced in a long finger with a trifid apex. Sternite from side large and rounded, from beneath deeply excised. Ninth segment with very thin rounded side-pieces, within which arises a strong,

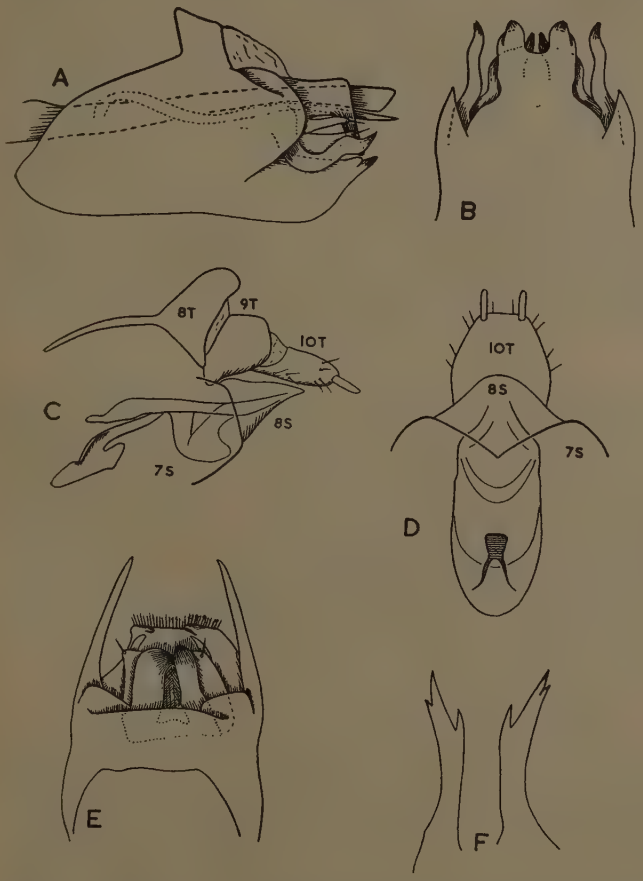


Fig. 2: Genitalia of *Oxyethira sagittifera* Ris, (A-D) and *O. distinctella* McLachlan (E-F). (A), ♂, lateral; (B), ♂, ventral; (C), ♀, lateral; (D), ♀, ventral; (E), ♂, dorsal (slightly tilted); (F), ♂, processes of eighth tergite, dorsal.

sinuous spine. Ventral margin produced in a quadrate plate, its apex with a U-shaped excision, the arms of the excision spatulate. Aedeagus slender, with a single, coiled, spiniform titillator. Claspers forming a pair of broad plates, fused basally, lower apical angle considerably produced downwards in a finger-like process. Upper membranous process finger-like from the side, obscure from beneath, lower large and conical.

♀ Genitalia. Seventh sternite with a wide V-shaped excision of the apical margin. Eighth tergite with its apical margin produced in a rounded lobe. Ninth tergite short and broad, completely free from eighth. Tenth segment rather longer than broad, with convex lateral margins, apex truncate. Eighth sternite triangular, with a rounded apex. Vaginal structure elongate, ventral process with a dilated, truncate apex.

Ponds, slow reaches of rivers, June, August.

Westmorland and Lake Lancashire, Perthshire, Galway. My colleague, Dr. W. E. China, and I took numerous examples of this species along the retaining wall of a very weedy fishpond (Blelham Fishpond, near Wray Castle, Lake District).

Oxyethira distinctella McLachlan (Fig. 2)

The material available for study is essentially the unique example from which Mosely prepared his 1939 account. There was also in the McLachlan collection a paratype, but since this now consists chiefly of one or two wings and some legs imbedded in cement on a pin, it is of no value for study. Since the unique British example has been mounted for a number of years in canada balsam, it is not considered advisable to attempt to dissolve it out to make drawings from other aspects and I have therefore contented myself with a slightly tilted dorsal aspect. My interpretation (apart from terminology) agrees well with Mosely's, although his statement that the ventral process of the seventh segment is perhaps wanting is incorrect. It is in fact clearly visible if one examines the preparation through the glass slide.

♂ Genitalia. Eighth tergite excised at its apex, the sides produced in long trifurcate processes. Sides of the eighth sternite large, concealing the ninth segment. Side-pieces of ninth segment produced in long, slender spines. Ventral margin produced in a hairy, quadrate, up-curved plate, whose apical angles are further produced in upwardly and inwardly directed hooks. Aedeagus rather obscure in the preparation, long, slender, with a single, curved, spine-like titillator. Claspers forming a pair of darkened, down-turned hooks, arising from a common base below the aedeagus, and above them two pairs of transparent processes, the upper broad, the lower slender.

♀. No material available.

Lake, July. Hants.

Oxyethira simplex Ris

♂ Genitalia. Eighth segment fused into a ring, lateral margins not produced nor armed with spines. Ninth segment moderately long, side-pieces only slightly produced. Ventral margin produced in a triangular lobe with a short, bifid apex directed caudad. Aedeagus with apex only slightly dilated, coiled spiniform titillator rather stout, obtusely angled towards apex. Claspers fused basally, forming broad plates whose apices are angled downwards. Upper pair of membranous processes rather bulbous, lower conical.

♀ Genitalia. Seventh sternite with apical margin widely and roundly excised. Eighth tergite short, fused to ninth, the centre of its apical margin scarcely produced. Ninth tergite short and deep. Tenth segment broad basally, the lateral margins running in concave sweeps to a narrow truncate apex. Eighth sternite with apical third semi-membraneous, rounded apically. Vaginal structure short and broad, central process tapering to apex, with a pre-apical constriction.

Rivers, lakes. May-September.

Hants, Oxon., Merioneth, Wigtownshire, Perthshire, Inverness, Galway.

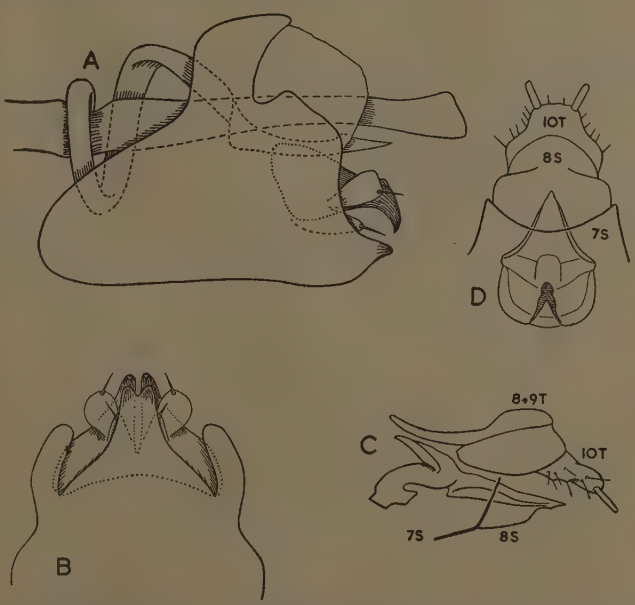


Fig. 3: Genitalia of *Oxyethira simplex* Ris. (A), ♂, lateral; (B), ♂, ventral; (C), ♀, lateral; (D), ♀, ventral.

Oxyethira costalis (Curtis)

♂ Genitalia. Eighth tergite excised apically at the centre to leave two blunt lobes, slightly down-curved from the sides, and armed with several short spines. Eighth sternite widely excised apically, its outer apical angles produced in strong incurved hooks. Ninth segment about as long as eighth, reduced above to a narrow, transverse bridge, which becomes membranous apically. Ventrally the ninth segment is produced in a broad scoop-like plate with an excised apex, the arms of the excision pigmented and up-curved apically. There is a patch

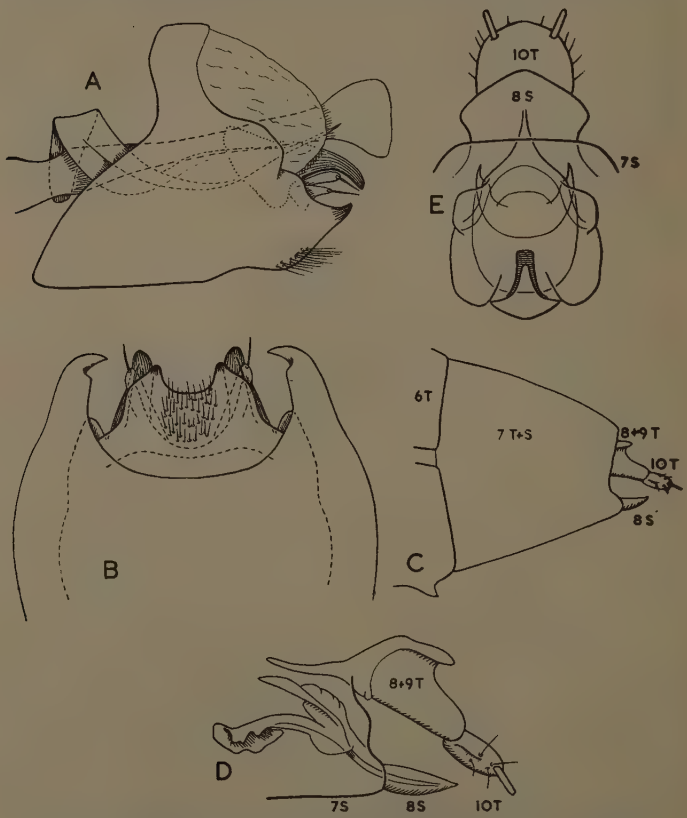


Fig. 4: Genitalia of *Oxyethira costalis* (Curtis). (A), ♂, lateral; (B), ♂, ventral; (C), ♀, apex of abdomen, lateral; (D), ♀, lateral; (E), ♀, ventral.

of setae in the centre of the plate. Side-pieces of the ninth segment bluntly rounded, but without incurved hooks. Aedeagus long, moderately slender, with an internal duct and dilated apex. Titillator single, broad, and blade-like, tapering to an acute apex, spirally coiled round the aedeagus and also spirally twisted on its longitudinal axis. Claspers forming a pair of pigmented, down-curved claws and above them are two pairs of transparent, short, finger-like processes, each with an apical seta.

♀ Genitalia. Apical margin of seventh sternite straight. Eighth tergite narrow, the centre of its apical margin produced in a spatulate lobe overhanging the ninth, which is fused to the eighth. Tenth segment short, about as broad as long, apical margin rounded. Eighth sternite with concave lateral margins, apex triangular. Vaginal structure short and broad, ventral process with apex truncate.

Rivers, lakes. May-September.

Devon, Somerset, Dorset, Hants, Surrey, Oxon., Norfolk, Cambs., Beds., Northants, Warwick, Brecknock, Merioneth, Caernarvon, Westmorland and Lake Lancs., Perth, Kerry, Galway, Dublin, Westmeath, Mayo, Donegal.

An abundant species.

Oxyethira frici Klapálek

♂ Genitalia. Close related to *O. falcata* Morton in general pattern of genitalia. Eighth segment similarly fused, lateral margins armed with about three long, strong spines. Ninth segment shorter, but with

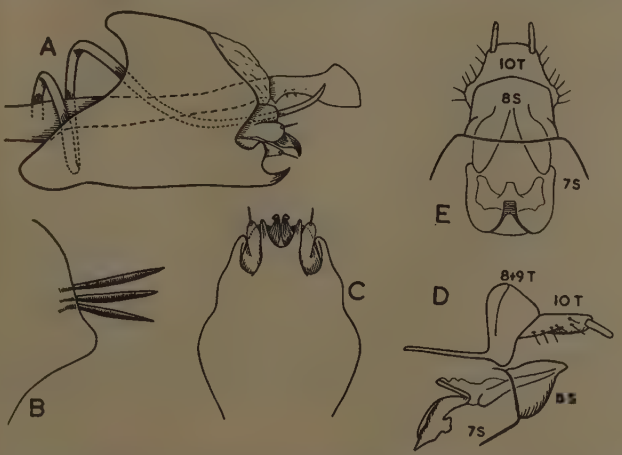


Fig. 5: Genitalia of *Oxyethira frici* Klapálek. (A), ♂, lateral; (B), ♂, spines of eighth segment, lateral; (C), ♂, ventral; (D), ♀, lateral; (E), ♀, ventral.

similar basally directed lobes dorsally. Side-pieces without ventral projection. Ventral margin produced in a single bifid process, the two branches slender and up-curved, and from the side with triangular processes on lateral margins directed dorsally. Aedeagus long, slender, dilated apically and with two or three spine-like teeth just before the apex. Coiled titillator spiniform. Claspers fused basally beneath the aedeagus, forming a pair of broad, hooked plates, apices directed downwards and with the usual two pairs of transparent processes.

♀ Genitalia. Seventh sternite with apical margin straight or slightly excised. Eighth tergite short, fused to ninth, its apical margin scarcely produced. Tenth segment broad, lateral margins running in concave sweeps to a truncate apex. Eighth sternite almost quadrate, apex shortly triangular. Vaginal structure short and broad, central process with a truncate apex.

Rivers. May-September.

Somerset, Hereford, Brecknock, Merioneth, Caernarvon, Westmorland and Lake Lancs., Perth, Inverness, Galway.

Oxyethira falcata Morton

♂ Genitalia. Tergite and sternite of eighth segment fused apically. Tergite with an apical, U-shaped excision, base of tergite elevated in a low median carina. Lateral margins of eighth segment more or less produced in rounded lobes armed with two or three stout black spines. Ventral margin excised. Ninth segment long ventrally, upper part reduced to a narrow, transverse band but with the sides extended basally in rounded lobes. Side-pieces forming rounded lobes, whose lower margins are extended downwards in a thin process. Apical margin of the sternite trilobed, the median lobe broader and larger than the side lobes, apex up-curved and acute. From the side the lateral margins of the median lobe are triangularly produced dorsally. Aedeagus long, slender, its apex dilated ventrally to form two thin, serrate lobes; titillator coiled and spiniform. Fused claspers forming a pair of broad plates below the aedeagus, apices bifurcate and directed ventro-caudad. Arising from them are two pairs of transparent processes, the upper and larger pyriform, the lower conical.

♀ Genitalia. Seventh sternite with apical margin widely and roundly excised. Eighth tergite fused to ninth, its apical margin extended in a spatulate lobe. Tenth segment short, tapering to a rounded apex. Eighth sternite broad, apex rounded. Within it can be seen a pair of sclerotized lobes resembling inverted commas. Vaginal structure short and broad, ventral process tapering slightly to a rounded apex.

Rivers, lakes. July-September.

Devon, Wilts., Dorset, Hants, Sussex, Kent, Bucks, Cambs., Pembroke, Merioneth, Yorks, Wigtownshire, Lanark, Perth, Galway, Mayo.

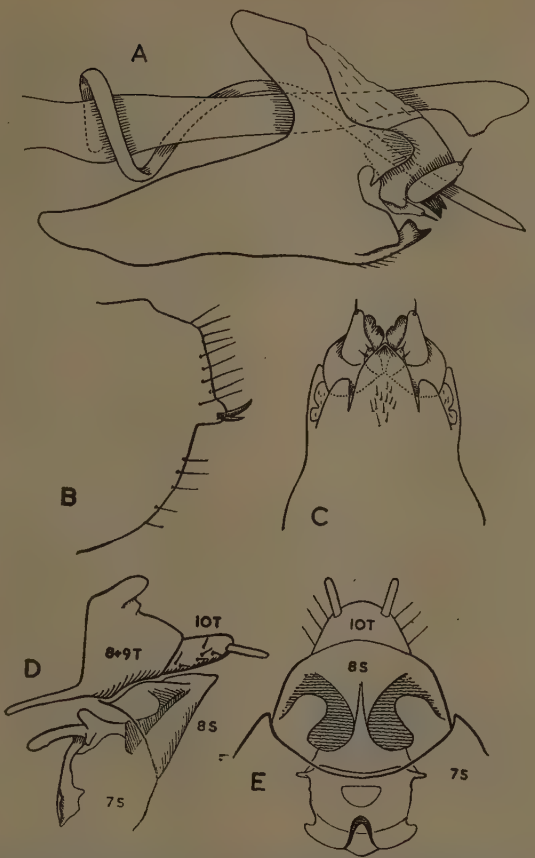


Fig. 6: Genitalia of *Oxyethira falcata* Morton. (A), ♂, lateral; (B), ♂, spines of eighth segment, lateral; (C), ♂, ventral; (D), ♀, lateral; (E), ♀, ventral.

COLIAS NOTED in 1957 (LEP: PIERIDAE)

A single specimen of *Colias hyale* (L.) was observed at Portland Bill, Dorset, on the morning of 24th August, 1957, and a single *C. croceus* (Geoff. in Fourc.) at Ockham Common, Surrey, 19th September.

29 Glenfield Road,
Banstead, Surrey.

A. E. GARDNER.

THREE DAYS IN WALES, 1956
(A LIST OF MOTHS: LEPIDOPTERA)

By J. R. LANGMAID

Several friends and readers have commented on my capture in Wales in 1956 of *Panaxia dominula* (L.) and *Mythimna turca* (L.) 1957, *Ent. Gaz.*, **8**: 37-38. Since it seems desirable I now publish the full list of moths taken in 1956 during the three days I spent in an area just south of the Dovey estuary from 21st to 23rd June.

SPHINGIDAE

Laothoë populi (L.)	Common
Smerinthus ocellata (L.)	One
Deilephila porcellus (L.)	Common
D. elpenor (L.)	Common

NOTODONTIDAE

Stauropus fagi (L.)	Common
Drymonia dodonaea (Schiff.)	Three
Pheosia tremula (C.)	One
Notodonta dromedarius (L.)	Few
N. anceps (Goez.)	One
Pterostoma palpina (L.)	One
Phalera bucephala (L.)	Very common

THYATIRIDAE

Tethea fluctuosa (Hb.)	Two

LYMANTRIIDAE

Dasychira pudibunda (L.)	Common

LASIOCAMPIDAE

Philudoria potatoria (L.)	One

DREPANIDAE

Drepana lacertinaria (L.)	One
Cilix glaucata (Scop.)	Common
ARCTIINAE	
Spilosoma lubricipeda (L.)	Common
S. lutea (Hufn.)	Common
Callimorpha jacobaeae (L.)	Common
LITHOSIINAE	
Cybosia mesomella (L.)	Common
HYPSINAE	
Panaxia dominula (L.)	A few

AGROTIDAE

AGROTINAE	
Brotis segetum (Schiff.)	Common
B. puta (Hb.)	Common
B. exclamationis (L.)	Very common
Lycophotia varia (Vill.)	A few
Diarsia rubi (Vieweg)	Common
Ochropleura plecta (L.)	Common
Amathes c-nigrum (L.)	Common
A. triangulum (Hufn.)	One
Axylia putris (L.)	Common
Noctua pronuba (L.)	Common
Graphiphora augur (F.)	A few

HADENINAE	
Mamestra brassicae (L.)	A few
Polia nebulosa (Hufn.)	One
Ceramica pisi (L.)	Common
Diataraxia oleracea (L.)	Common
Hadena thalassina (Hufn.)	Common
H. bicruris (Hufn.)	Common
H. cucubali (Schiff.)	Common
Eumichtis adusta (Esp.)	Common
Leucania comma (L.)	Common
Mythimna turca (L.)	Very common
Cucullia umbratica (L.)	Common
ACRONICTINAE	
Apatele alni (L.)	Two
A. menyanthidis (View.)	One
A. psi (L.)	Common
A. rumicis (L.)	Common
Cryphia perla (Schiff.)	One
AMPHIPYRINAE	
Rusina umbratica (Goez.)	Common
Apamea remissa (Hb.)	Common
A. monoglypha (Hufn.)	A few
A. crenata (Hufn.)	Common
A. sordens (Hufn.)	Common
Procus strigilis (Cl.)	Common
P. fasciuncula (Haw.)	Common
Euplexia lucipara (L.)	One
Phlogophora meticulosa (L.)	Common
Meristis trigrammica (Hufn.)	Common
Caradrina morpheus (Hufn.)	Common
C. clavipalpis (Scop.)	A few
WESTERMANNIINAE	
Bena fagana (F.)	A few
EUSTROTIINAE	
Lithacodia fasciana (L.)	Common
SARROTHRIPINAE	
Euclidimera mi (Cl.)	One
PANTHEINAE	
Plusia chrysitis (L.)	Common
P. jota (L.)	Common
P. gamma (L.)	Very common
Unca tripartita (Hufn.)	Common
OPHIDERINAE	
Scoliopteryx libatrix (L.)	One
HYPENINAE	
Bomolocha fontis (Thunb.)	Common
Hypena proboscidalis (L.)	One
Zanclognatha grisealis (Schiff.)	A few

GEOMETRIDAE

OENOCHROMINAE	
Pseudoterpna pruinata (Hufn.)	One
Jodis lactearia (L.)	A few
STERRHINAE	
Sterrha aversata (L.)	Common
S. lactata (Haw.)	Common
Calothysanis amata (L.)	Common
LARENTIINAE	
Xanthorhoë spadicearia (Schiff.)	Very common

X. designata (Hufn.)	Common
X. montanata (Schiff.)	Common
X. fluctuata (L.)	Very common
Ortholitha mucronata (Scop.)	Very common
Colostygia pectinataria (Knoch)	Very common
Perizoma affinitata (Steph.)	Common
P. albulata (Schiff.)	Very common
Entephria flavofasciata (Hb.)	A few
Euphyia bilineata (L.)	One
Lyncometra ocellata L.	Common
Electrophaës corylata (Thunb.)	One
Ecliptoptera silaceata (Schiff.)	One
Lygris prunata (L.)	Common
Dysstroma truncata (Hufn.)	Very common
Thera variata (Schiff.)	Very common
Odezia atrata (L.)	Very common
Anaitis plagiata (L.)	One
Epirrhoë alternata (Müll.)	Very common
E. tristata (L.)	Very common
Eupithecia pulchellata Steph.	Common
E. vulgata (Haw.)	Common
E. castigata (Hb.)	Very common
Mysticoptera sexalisata (Retz.)	One
ENNOMINAE	
Lomaspilis marginata (L.)	Very common
Bapta temerata (Schiff.)	Common
Cabera exanthemata (Scop.)	Very common
Campaea margaritata (L.)	Two
Gonodontis bidentata (Cl.)	One
Plagodis dolabraria (L.)	Common
Opisthograptis luteolata (L.)	Very common
Semiothisa liturata (Cl.)	A few
Biston betularia (L.)	Common
Aethalura punctulata (Schiff.)	One
Lithina chlorosata (Scop.)	Very common
Hydrelia flammeolaria (Hufn.)	One
HEPIALIDAE	
Hepialus humuli (L.)	Very common
H. fusconebulosa (Deg.)	Common
ZYGAENIDAE	
Procris statices (L.)	Common

A LONDON RECORD OF PLUSIA BRACTEA (SCHIFF.) (LEP: PLUSIIDAE)

As this species does not seem to have been previously recorded from the London area, it seems worth putting on record that a male specimen of *Plusia bractea* was taken in my trap on the night of 22nd/23rd July, 1956.

R. I. LORIMER.

8 Southway,
Totteridge, N.20.

THE LARVA OF *OECETIS LACUSTRIS* (PICTET) (TRICHOPTERA: LEPTOCERIDAE)

By HILMY M. HANNA, Ph.D., F.R.E.S.
(*Zoology Department, University of Reading*)

On 28th April, 1955, about fifty full-grown larvae were collected from Millbarn pond at Wokefield, near Reading. The larvae were found on the sandy bottom together with the larvae of *Molanna angustata* Curt., *Athripsodes aterrima* (Steph.), *A. cinerea* (Curt.) and *Mystacides longicornis* (L.). It is interesting to note that this one pond has yielded one-third of the species of caddis flies known in Great Britain (Crichton, Baker and Hanna, 1956). The adults emerged in the laboratory between 15th July and 21st September.

Case:

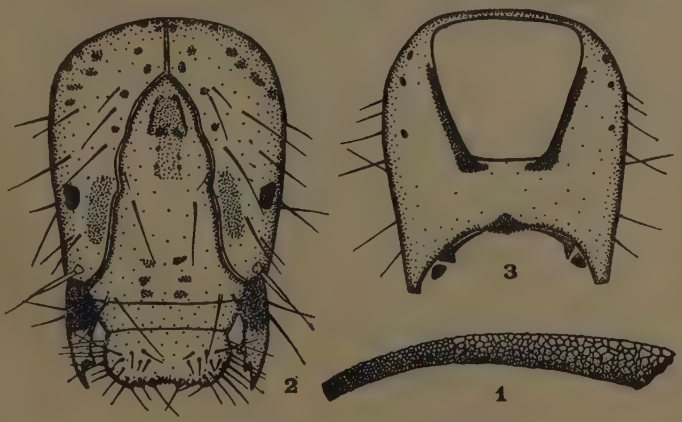
The curved tapered cases are up to 8.5 mm. long and 0.9 mm. wide at the anterior end. The cases are built of fine sand grains.

Larvae:

The larva is eruciform. The larvae examined measured up to 6.9 mm. in length and 0.8 mm. in width.

Head:

The head is hypognathous and creamy in colour with a dark brown pattern on the anterior surfaces of the genae and on the fronto-clypeus. There are six dark brown spots at the oral end of the fronto-clypeus and a large median pattern at its aboral end. The latter pattern varies in shape and size from one specimen to another.



OECETIS LACUSTRIS (PICTET)
Figs. 1-3. (1) Larval case. (2) Head from the front. (3) Head from behind.

The anterior surfaces of the genae have two dark brown bands near the margins of the fronto-clypeus, in the region between the eyes, and also some dark brown spots aborally. The posterior surfaces of the genae are pale yellow except for two greyish brown rod-like areas on both sides of the occipital foramen. There are also a few indistinct greyish brown spots aborally. The gular sclerite is probably represented by the small greyish brown area above the labium. As there is no genal suture the two genae fuse above the gular sclerite.

Labrum:

The ventral margin of the labrum is indented and has a small concavity in the centre. There are many setae on each side of this concavity.

Mandibles:

Each mandible has three sharp teeth, of which the outermost is the longest. The outer margin of each mandible has two long setae near the base. The inner margin has four to seven denticles.

Maxilla:

The cardo is devoid of setae whereas the stipes bears two setae. The maxillary palp has five segments. The lacinia bears a few sensilla and setae.

OECETIS LACUSTRIS (PICTET)

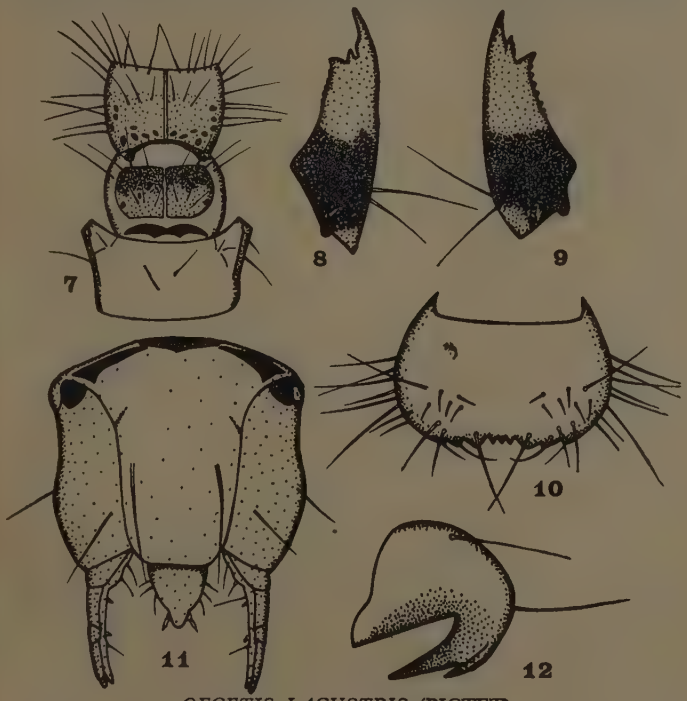
Figs. 4-6. (4) Prothoracic leg. (5) Mesothoracic leg. (6) Metathoracic leg.

Thorax:

The pronotum is entirely sclerotized, and has a median longitudinal suture. The anterior third is pale yellow and the posterior two-thirds, which has dark brown spots, is greyish brown. The posterior margin of the pronotum is strongly sclerotized and is chestnut brown. The mesonotum has three sclerites. The two anterior sclerites are separated by a median longitudinal suture. They are chestnut brown anteriorly, greyish brown posteriorly and have a dark brown pattern. They may possess two lighter areas in the postero-lateral corners. The third sclerite is transverse, chestnut brown and has a constriction in the middle. The metanotum is soft except for two long, narrow, black sclerites at the sides.

Legs:

The prothoracic leg is short and robust. The inner surfaces of the femur, tibia and tarsus have small spines. The meso- and meta-



OECETIS LACUSTRIS (PICTET)

Figs. 7-12. (7) Thoracic nota from above. (8) Left mandible. (9) Right mandible. (10) Labrum. (11) Labium and maxillae. (12) Anal claw.

thoracic legs have small spines on the inner surfaces of the tibiae and tarsi, whereas they are absent on the femora. All the legs are hairy.

Abdomen:

On the first abdominal segment there are three protuberances of which the dorsal is the longest. Each lateral protuberance has a dark brown crescent-shaped sclerite at its inner ventral margin. The abdominal gills are present on segments one to six. The lateral line is represented by fine hairs on the third to the seventh abdominal segments. The anal sclerite is absent. There are six long setae and a few short setae on the tergum of the ninth abdominal segment. The anal claw has an auxiliary claw at its base.

The genus *Oecetis* is represented by five species in the list of British Trichoptera. The larvae of the other four species have not yet been described from British material.

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PRESERVATION OF LEPIDOPTEROUS LARVAE

As many of our friends and colleagues know, we are engaged in the formation of a collection of larvae of the British *Macrolepidoptera,* showing the range of forms and variation. At the same time we aim to add to the British Museum collection at Tring and also to those of the South London Ent. and Nat. Hist. Society and of the Birmingham Museum and Art Gallery, where existing important collections are housed. This is, of course, in addition to the work of describing and illustrating those species that do not appear in Buckler's Volumes.

We are greatly encouraged by, and deeply indebted to, an ever increasing circle of workers who are generous enough to provide material for these purposes: but it is still not generally known that collectors who desire to have preserved larvae of any particular species they may obtain or are rearing, may have them returned from whatever is donated and are invited to contribute on that basis.

Any correspondence or offers, please, to the address given below.

Our thanks are due for the Editors' suggestion to publish this note.

16 Elton Grove, H. E. HAMMOND.
Birmingham, 27. G. HAGGETT.

AN ACCOUNT OF THE EUPITHECIAS (LEP: GEOMETRIDAE) OF WEST SUSSEX

By G. HAGGETT

Heslop (1947-1953) lists 55 species of four genera to form a subfamily of Eupitheciinae, six of the species being of doubtful status as species or as British species: they form a widely distributed group of which only a few are restricted to limited ranges within the British Isles, although others may be very local; the majority may be expected to occur wherever their common foodplants grow.

Yet along with the Waves and Clearwings, the Pugs remain a curiously neglected group, dismissed by many collectors as hard to find and worse to recognize because the moths are rarely very plentiful and superficially they look much alike; they suffer also in that they do not appear frequently enough in the mercury vapour trap. However, the larvae are much more easily sought, and the maxim that a successful lepidopterist must be also a well informed botanist applies more forcibly to the collector of Pugs than to any other; for once the correct foodplants are located it is usually an easy matter to obtain a good number of larvae, enough indeed to allow for the heavy losses from parasitism that are the rule amongst Pugs.

Past records and recent collecting show 42 species to be present in West Sussex, and although a few of them have been lost sight of one feels this is due more to oversight or negligence than to a change on the part of the insects. Amongst those species we may still expect to find are *Eupithecia palustraria* Doubld., *E. virgaureata* Doubld., and *E. plumbeolata* (Haw.), for their foodplants are common enough.

Eupithecia centaureata (Schiff.). Moths very common in all situations from May to August, the larvae polyphagous on blossoms especially of Compositae, and very variable in pattern and colour. One moth at Arundel with dark costal blotch and outer marginal shading both greatly reduced.

E. pulchellata Steph. Becomes common when Foxgloves (*Digitalis purpurea* L.) appear on newly felled areas in woodlands, but is not easily obtainable at other times.

E. linariata (Schiff.). Locally common in the Storrington district (Robertson). Fletcher (1905) gives Amberley. The foodplants are very common along the South Downs, but I have found larvae only on the coast, at Lancing, Goring and Shoreham.

E. irriguata (Hb.). Dr. Robertson (1934) says 'local and scarce' at Storrington. Fletcher (1905) had it from Fernhurst.

E. tantillaria Boisd. One at light, Arundel, May, 1952.

E. indigata Hb. Inhabits the natural pine woods and commons of Wiggonholt and Sutton. Larvae to me seem easier to beat from the

bushy boughs of older, open grown trees than from the lower branches of plantation trees.

E. insigniata (Hb.). Known only from Arundel, where a few moths have been seen at light in most years since the war.

E. venosata (F.). Occurs wherever there is an abundance of *Silene cucubalus* Wib., but is most commonly met with on the downs.

E. pimpinellata (Hb.). Larvae common at Houghton Hill and Storrington on the downs wherever *Pimpinella* grows, but the plant is easily overlooked as it becomes flattened amongst grasses and low herbs. Parasitism is very severe.

E. distinctaria H.-S. I found a full grown larva on Storrington downs 26.viii.54 and searched hard by day and night for others without success, both during the following week and in the next year.

E. expallidata Doubld. Larvae were abundant on Goldenrod (*Solidago virga-aurea* L.) in the Arundel woods in early October, 1951, but were heavily parasitized.

E. assimilata Doubld. Not common at Arundel, although a 'common' account of it is given in the Victoria History

E. absinthiata (Clerck). Common in all situations, the larvae on a great many plants and flowers throughout the summer and autumn.

E. goossensiata Mab. Plentiful on the heather commons of Wiggonholt Common and Hurston Warren.

E. denotata Hb. Larvae very common in Angmering Woods in 1949 on seed pods of the Nettle leaved Bell flower (*Campanula trachelium* L.), popularly called the Canterbury Bell: when young, larvae feed inside the seed capsules, but later they rest among the withered heads where they are well camouflaged. Fletcher (1905) gives South Stoke as a locality.

E. millefoliata Rössl. Larvae occur on Yarrow (*Achillea millefolium* L.) along the coast from Shoreham to Selsey, but with the exception of the Pulborough record the species does not seem to venture far inland. Abundant at Chichester in 1955.

E. tripunctaria H.-S. Double brooded at Arundel, the moths at light in May, June and August. Larvae most usually on Wild Parsnip (*Pastinaca sativa* L.), Hogweed (*Heracleum sphondylium* L.) and Angelica (*Angelica sylvestris* L.), ab. *angelicata* Prout at Arundel.

E. vulgata (Haw.). Abundant in all situations from May to August, the larva polyphagous.

E. trisignaria H.-S. Larvae on Wild Parsnip (*Pastinaca sativa* L.) in September in the Arundel woods, not common; occasional specimen of the moth at light there.

E. lariciata Freyer. Fletcher (1905) lists Charlton Forest and Slindon Common. I have taken it at Arundel at light only.

E. castigata (Hb.). Common in all situations in May and June, larvae frequent but widely scattered on many plants in autumn.

E. intricata Zett. s.sp. *arceuthata* Freyer. Common in gardens of Arundel and Rustington, the moths at light from late May until

August, the larvae on Cypress in October. Occurs also on Juniper (*Juniperus communis*, L.) on the downs at Upwaltham but is much scarcer there. Moths normally well marked, but occasional examples with all markings suppressed except the discal dot.

E. satyrata (Hb.). 'Not common' at Storrington (Robertson), I have never been able to find this.

E. succenturiata (L.). Larvae have been beaten from Mugwort (*Artemesia vulgaris* L.) at Storrington, Chichester, Warningcamp and Pulborough, and odd moths have come to light at Arundel and West Chiltington.

E. icterata (Vill.) s.sp. *subfulvata* (Haw.). Common throughout the district.

E. haworthiata Doubld. Common in many situations but particularly abundant on the Clematis (*Clematis vitalba* L.) of hedgerows and coombes of the downs. The variable larva best taken in August by collecting bags of flower heads that show a tiny black flaw.

E. valerianata (Hb.). Larvae common in some years on Cat's Valerian (*Valeriana officinalis* L.) along the river banks at Arundel. Recorded also from Clapham Woods and Storrington.

E. tenuiata (Hb.). Recorded from Slindon Common by Fletcher (1905) and from Storrington by Robertson (1934). I have taken the larva abundantly from sallows in the Tortington and Rewell Woods; a good sized bag of catkins collected about the second week of April will yield dozens of larvae.

E. inturbata (Hb.). Long known from old Maples (*Acer campestre* L.) in Arundel Park. Larvae were in prodigious numbers there in May, 1953. Occasional examples of the moth to light in other parts of Arundel.

E. innotata (Hufn.) s.sp. *fraxinata* Crewe. Listed in the Victoria History from Bognor, this being probably the same as Lloyd's (1884) early record.

E. nanata (Hb.). Plentiful on all heather commons of West Sussex, the moth from May to August, the very variable larva most frequent in autumn but obtainable also in spring and summer.

E. abbreviata Steph. Common in all Oak Woods; one melanic specimen at Arundel in 1952.

E. dodoneata Guen. Recorded from Bognor by Lloyd (1884), who said the moth occurred amongst evergreen oak (*Quercus ilex* L.). The moth is generally infrequent in the Arundel and other oak woods, but caterpillars may be beaten in quantity in some years.

E. exiguata (Hb.). Generally distributed but never very plentiful.

E. sobrinata (Hb.). Larvae on Juniper (*Juniperus communis* L.) on the downs of Storrington and Upwaltham in June, a moth at Arundel in 1950 where the species may be like *E. arceuthata* in feeding on cultivated conifers.

E. strobilata Borkh. (*pini* L.). In some personal notes on this species Fletcher wrote 'fallen cones in Rewell Wood show signs of

larval work', but in the Victoria History he more cautiously stated 'Fallen cones eaten by larvae which may have been of this species have been noticed in a wood near Slindon'. There are no other records.

E. subnotata (Hb.). The moth occurs on waste ground and marginal land at Arundel and West Chiltington, but I cannot find the larva. Recorded also from Bognor.

E. subumbrata (Schiff. (*scabiosata* (Borkh.)). Frequents grassy clearings of the upper Rewell Woods, also sheltered corners of the downs from Bury Hill to Arundel Park. The moth at light and privet blossom in June and July, the larva most usually on Lady's Bedstraw (*Galium verum* L.) in September.

Gymnoscelis pumilata (Hb.). Odd specimens appear in most situations from spring throughout the summer; I have found larvae only on *Erica* flowers in heathy districts.

Chloroclystis coronata (Hb.). Regularly met with from June to August, in some years as early as the end of April; larvae on Clematis (*C. vitalba* L.) in autumn.

C. rectangulata (L.). Not common. Green and blackish forms of the moth of equal frequency from June to August.

C. debiliata (Hb.). Larvae have been found in recent years on Bilberry (*Vaccinium myrtillus* L.) at Blackdown, near Fernhurst.

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AMATHES XANTHOGRAPHA (SCHIFF.) IN BIRMINGHAM (LEP. AGROTIDAE)

My notes on this species read as follows:

'Final larval instar reached annually from mid-November until the end of April, feeding throughout the winter. The species does not pupate normally until the end of March. Torpid during cold spells, but does not fully hibernate in any stadium.'

I have, very occasionally, noted a largish larva in November, but on 25th October I had occasion to gather up some *Apamea sordens* Hufn. for preserving, and to my surprise I found, not one, but dozens of *xanthographa* quite fully grown.

No doubt the absence of early frosts has encouraged abnormal growth in this species and possibly in other species which do not complete growth until the following spring. If we are fortunate enough to have an early spring in 1958 there may well be some surprisingly early emergence dates recorded.

H. E. HAMMOND.

MORE INFORMATION CONCERNING THE DISTRIBUTION AND HOSTS OF SIPHONAPTERA IN BRITAIN

By R. S. GEORGE, F.L.S., F.R.E.S.

British Siphonapterists have had the fortune this year of receiving an immense amount of help through the medium of two very important papers by F. G. A. M. Smit (307, 308). The second in order of publication gives details of collecting methods and mounting specimens and very good keys for the determination of the 56 forms of fleas listed in the British fauna. It finishes with a new ecological classification of fleas based upon the nesting conditions of the hosts. In logical order, though actually published first, is a paper which lists 61 forms, the additional five being hybrid or intermediate forms, and gives for each a host list and a county list. A most important part of this paper is a bibliography of 293 items which are concerned with the distribution of British fleas. I now bring forward additional references and records from the literature which have come to my notice, and new county records from specimens sent to me for examination. Host and county records additional to Smit's list from either source are marked with a dagger (†).

Pulex irritans L. ENGLAND: Gloucestershire 298; Herefordshire † 300. SCOTLAND: Fair Isle † (i) 314.

Xenopsylla cheopis (Roths.). ENGLAND: Gloucestershire 298; London 309.

Archaeopsylla e. erinacei (Bouché). ENGLAND: Gloucestershire 298.

Ctenocephalides canis (Curtis). ENGLAND: Gloucestershire 298.

Ctenocephalides f. felis (Bouché). ENGLAND: Gloucestershire 298.

Spilopsyllus cuniculi (Dale). ENGLAND: Gloucestershire 298; Kent † 311 (by inference). WALES: Skomęr (i) 295, 303, 311. SCOTLAND: Aberdeenshire 294, 304.

Ornithopsylla laetitiae Roths. ENGLAND: Scilly Isles (i) 310. WALES: Bardsey (i) 310; Skokholm (i) 310; Skomer (i) 310. IRELAND: Great Skellig Rock (i) 310; Ireland's Eye (i) 310.

Hystrichopsylla t. talpae (Curtis). ENGLAND: Berkshire 302; Devon 302; Gloucestershire 298; Hampshire 305; Herefordshire † 300; Monmouth †. WALES: Skokholm (i) 296. SCOTLAND: Mull † (i).

Typhloceras poppei Wagner. SCOTLAND: Fair Isle (i) 314.

Rhadinopsylla integella Jord., & Roths. SCOTLAND: Argyllshire †.

Rhadinopsylla pentacantha (Roths.). ENGLAND: Gloucestershire 298.

Doratopsylla d. dasycnema (Roths.). ENGLAND: Gloucestershire 298; Herefordshire †; Kent †.

Palaeopsylla m. minor (Dale). ENGLAND: Gloucestershire 298, 299; Herefordshire †. SCOTLAND: Angus †.

Palaeopsylla s. soricis (Dale). ENGLAND: Cumberland †; Gloucestershire 299. SCOTLAND: Mull † (i).

Ctenophthalmus n. nobilis (Roths.). ENGLAND: Derbyshire †; Gloucestershire † 299. WALES: Skokholm † (i) 296. SCOTLAND: Angus †; Perthshire †.

Ctenophthalmus n. vulgaris Smit. ENGLAND: Gloucestershire 298, 299; Herefordshire †; Lancashire †. WALES: Skokholm † (i) 296.

C. n. nobilis x *C. n. vulgaris*. ENGLAND: Devon †. WALES: Skokholm † (i). SCOTLAND: Angus †.

Ctenophthalmus bisoctodentatus occidentalis Smit. ENGLAND: Gloucestershire 298; Herefordshire †; Northumberland †.

Ischnopsyllus elongatus (Curtis). ENGLAND: Gloucestershire 298.

Ischnopsyllus octactenus (Kolenati). ENGLAND: Berkshire 315; Buckinghamshire † 315; Gloucestershire 298; Hampshire † 315. WALES: Denbighshire † 301.

Ischnopsyllus s. simplex Roths. ENGLAND: Gloucestershire 298. WALES: Denbighshire 301.

Ischnopsyllus hexactenus (Kolenati). ENGLAND: Gloucestershire 298.

Nycteridopsylla longiceps Roths. ENGLAND: Gloucestershire † 299.

Leptopsylla segnis (Schönherr). Mammalia: [*Apodemus flavicollis* †]. ENGLAND: Gloucestershire 298; Herefordshire †. SCOTLAND: Angus †.

Peromyscopsylla silvatica spectabilis (Roths.). ENGLAND: Gloucestershire 298.

Dasypsyllus g. gallinulae (Dale). ENGLAND: Gloucestershire 298; Herefordshire †; Kent †. WALES: Caernarvonshire †; Bardsey † (i) 310. SCOTLAND: Angus †; Fair Isle (i) 312, 313, 314; Orkney (i) 297; Shetland, Uyea (i) 297.

Malaraeus penicilliger mustelae (Dale). ENGLAND: Gloucestershire 298; Herefordshire †; Kent †. SCOTLAND: Mull † (i).

Orchopeas h. howardi (Baker). ENGLAND: Gloucestershire 298; Hampshire 306; Kent †.

Nosopsyllus fasciatus (Bosc). ENGLAND: Gloucestershire 298; Herefordshire †. WALES: Skokholm † (i).

Megabothris rectangulatus (Wahlgren). SCOTLAND: Argyllshire 309.

Megabothris turbidus (Roths.). Mammalia: *Apodemus flavicollis* †. ENGLAND: Gloucestershire 298, 299; Herefordshire †.

Megabothris walkeri (Roths.). ENGLAND: Gloucestershire 298; Herefordshire †; Lancashire †. SCOTLAND: Perthshire †.

Monopsyllus s. sciurorum (Schrank). Mammalia: [Homo sapiens †]. ENGLAND: Gloucestershire 298.

Ceratophyllus g. gallinae (Schrank). ENGLAND: Gloucestershire 298; Herefordshire 300. WALES: Caernarvonshire †. SCOTLAND: Argyllshire †; Fair Isle (i) 312, 313, 314; Ross 297.

Ceratophyllus fringillae (Walker). Aves: [*Riparia riparia* †]. ENGLAND: Gloucestershire 298.

Ceratophyllus vagabundus insularis Roths. SCOTLAND: Fair Isle † (i) 314; St. Kilda (i) 297.

Ceratophyllus rusticus Wagner. ENGLAND: Gloucestershire 298.

Ceratophyllus hirundinis (Curtis). ENGLAND: Gloucestershire 298. SCOTLAND: Angus †.

Ceratophyllus f. farreni Roths. ENGLAND: Gloucestershire 298. SCOTLAND: Angus †.

Ceratophyllus s. styx Roths. ENGLAND: Gloucestershire 298, 299; Kent †; Wiltshire †.

Ceratophyllus s. jordani Smit. ENGLAND: Dorset †; Wiltshire †. Wiltshire †.

C. s. styx x *C. s. jordani*. ENGLAND: Gloucestershire 298, 299; *Ceratophyllus styx* ssp. ENGLAND: Hereford † 300.

Ceratophyllus columbae Gervais. ENGLAND: Gloucestershire 298.

Ceratophyllus garei Roths. SCOTLAND: Fair Isle (i) 313.

Ceratophyllus borealis Roths. Aves: *Muscicapa striata* †. WALES: Bardsey (i) 310. SCOTLAND: Angus †; Fair Isle (i) 312, 313, 314.

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BOOK REVIEW

The Lepidoptera of Iraq, by E. P. Wiltshire. London: Nicholas Kaye, 1957. Lge. 8vo. pp. 162. 17 plates (2 coloured). Price £2 5s.

This book was commissioned by the Iraqi Government Ministry of Agriculture and is officially called a 'second edition'.

Anyone familiar with the 'first edition' will regret this description. The present work is so superior to and different from the first (published in 1944 as Bulletin No. 30), that almost the only resemblance is that they both bear the same author's name.

The present book is one which will fill a great gap as it treats the whole of the Macrolepidoptera at present known from Iraq. It is excellently produced, printed and illustrated, and the proof-reading has been of a very high order.

If the book has any major fault it is one which the author carefully disclaims in advance—but there can be no doubt that a great opportunity was lost in not providing keys for identification. The greater number of species are referred to only by name, and this is a disadvantage for the student or pest control officer who is not within easy reach of a major scientific library. This criticism is made in the sincere hope that it may induce the publication of a second volume which would remedy this important omission.

Having made this criticism it should be made clear that the many aspects of the subject which are touched upon have all been most thoroughly and competently handled—and for many readers will be an introduction to some aspects of Entomology with which they are not familiar.

The excellent coloured and black and white plates greatly enhance the value of the book.

R.W.C.

THE DISPERSAL OF MOTHS

By The Reverend J. H. Vine Hall, B.D., A.K.C.

Readers of the *Entomologist's Gazette* will know from previous papers by myself (1954, Vol. **5**, pp. 125-134 and 243-4; 1956, Vol. **7**, pp. 185-7) that I have worked a Mercury Vapour Light Trap in the grounds of Hutton Roof Vicarage in South Westmorland for the past five years. An interesting and unexpected result has emerged. It concerns the large number of species of which only one or two specimens have appeared during the whole five years of operation. I always expected that there would be a certain number of species in this category, but not that the list would prove to be so long. And it still continues to grow, four more being added since the final postscript of my last article (30th July, 1956). The following notes are submitted in the hope that they may be of use in helping to amass evidence of the dispersal of moths. Apart from species with a migratory tendency, of which only one clear example occurs in the ensuing list, insects tend to inhabit sharply defined areas, and to wander comparatively little from them. Instances of this can readily be seen anywhere and I mention one or two from this neighbourhood. For example, a colony of *Argynnis euphrosyne* (L.) occurs on Hutton Roof Crag less than half a mile from the Vicarage, and colonies of *Aricia agestis* (Schiff.) and *Erynnis tages* (L.) occur within three-quarters of a mile, yet I have never seen a single specimen of any of them in my garden. Or, to take an example from the moths, a colony of *Colostygia olivata* (Schiff.) occurs on the Crag not half a mile away and a colony of *Thera cognata* (Thunb.) occurs in a slightly different direction in a juniper thicket about three-quarters of a mile distant. Yet not a single specimen of either species has appeared in the trap, though *Eupithecia sobrinata* (Hübn.) which occurs in the same juniper thicket is, curiously enough, a very regular visitor. There are no other juniper bushes nearer to the Vicarage—yet one species wanders to the trap, while the other does not. The specimens detailed in the following list must have been flying naturally close to the trap in order to have found their way inside it, and some, representing species which one would least imagine to be wanderers, must have come from a good distance away. Others may well breed in the neighbourhood, but in very small numbers. An interesting fact is that if the list were to be extended so as to show species which have appeared three, four or five times it would not be very much longer than it is at present. The scarcer species which have appeared more than twice have in by far the majority of instances appeared six times or more, and one is, I think, entitled to assume that an insect which has put in that number of appearances is breeding at any rate fairly close at hand. Actually of course most species have been represented by several hundred specimens during the past five years, though few can be said to constitute a pest. I

counted 252 specimens of *Erannis defoliaria* (Clerck) on 14th November, 1953, and on many occasions there have been over 100 specimens of *Oporinia dilutata* (Schiff.). Yet I would not call either of them normally a pest. *Orthosia gothica* (L.) (e.g. 107 on 27th April, 1955) comes nearer to being a nuisance, but the only two species which are really tiresome are *Agrotis exclamationis* (L.) (but see 1955 *Ent. Rec.* **67**: 239 for a note on its scarcity in 1955) and *Triphaena pronuba* (L.)—the worst of all, for its period of emergence is so protracted as well as its numbers so vast (first seen 15th June, 1956, and last seen 14th October, appearing in hundreds between those dates, e.g. 226 counted on 10th August). Far more interesting are the insects at the other end of the scale, a list of which now follows.

A. Species seen once only in the period 1952-6 *inclusive:*

1. *Cerura furcula* (Clerck) 14.7.56 ♀. May breed near at hand but seldom seen in this area. Most often reported from the Witherslack area, 9 miles away.
2. *Nola cucullatella* (L.) 2.7.52 ♂. No obvious explanation for this singleton comes to mind.
3. *Apatele leporina* (L.) 14.6.52 ♂. Same remarks apply as under *C. furcula.*
4. *Apatele megacephala* (Schiff.) 14.7.55 ♂. Not scarce at Kendal, 10 miles away.
5. *Diarsia dahlii* (Hübn.) 6.9.56 ♂. Very seldom seen in this area, but reported from woods in the Silverdale area, 6 miles away.
6. *Polia tincta* (Brahm) 14.6.52 ♂. Same remarks apply as under *C. furcula.*
7. *Hadena suasa* (Schiff.) 25.6.56 ♀. Very seldom seen in the area. Once at Kendal. Perhaps chiefly on coast, e.g. Grange-over-Sands.
8. *Hadena trifolii* (Hufn.) 15.8.53 ♂. Strange that this should have appeared only once.
9. *Thalpophila matura* (Hufn.) 26.7.52 ♂. Appears to be uncommon generally.
10. *Procus furuncula* (Schiff.) 25.8.54 ♂. This coastal species may have wandered from Morecambe Bay—nearest point on coast Arnside, 7½ miles away.
11. *Apamea unanimis* (Hübn.) 14.7.55 ♂. Doubts have entered my mind as to whether the specimens recorded in my original paper really were this species. They were not kept, but the present record is authentic and the specimen was retained. Scarce generally and very occasionally seen at Kendal.
12. *Apamea ypsilon* (Schiff.) 26.7.52 ♂. Uncommon in the neighbourhood.
13. *Nonagria typhae* (Thunb.) 24.8.53 ♂. No likely habitat nearby. Leighton Marsh, Silverdale, 6 miles away, holds this species. No nearer colony known.

14. *Caradrina morpheus* (Hufn.) 4.7.55 ♂. Taken commonly at Kendal. No apparent reason for its scarcity here.
15. *Laphygma exigua* (Hübn.) 6.9.53 ♂. A casual migrant—the only one in this list.
16. *Zenobia subtusa* (Schiff.) 9.8.53 ♀. In my original list this appears as *Z. retusa*, an error which arose through copying the wrong name. There never was any doubt as to the correct identity. Scarce in the neighbourhood.
17. *Anchoscelis litura* (L.) 21.9.55 ♂. Common at Kendal. There is no obvious explanation of its rarity here.
18. *Xylena exsoleta* (L.) 15.4.52, ♂. Scarce in the neighbourhood.
19. *Cucullia verbasci* (L.) 22.5.56 ♂. Chiefly known from the Witherslack area, 9 miles away, but there might be colonies rather nearer.
20. *Scoliopteryx libatrix* (L.) 25.4.56 ♂. This ought to be commoner, and it is not easy to account for this singleton.
21. *Plusia interrogationis* (L.) 20.7.55 ♂. The colonies of the species are on the moorlands, the nearest expanse of any appreciable size being 8 miles away to the north.
22. *Hemithea strigata* (Müll.) 29.7.56 ♂. This species is not found frequently in this area.
23. *Sterrha inornata* (Haw.) 25.7.52 ♂. Associated almost exclusively with the mosses, as at Witherslack, 9 miles away.
24. *Scopula* (*floslactata* (Haw.)) *lactata* (Haw.) 23.6.56 ♂. Same remarks apply as to *S. inornata*.
25. *Philereme transversata* (Hufn.) 21.7.52 ♂. Chiefly found on the limestone around Witherslack, but could occur much nearer.
26. *Orthonama lignata* (Hübn.) 13.9.56 ♂. There is a strong colony at Leighton Marsh, Silverdale, 6 miles away, and a dearth of likely spots nearby.
27. *Pelurga comitata* (L.) 21.7.52 ♂. Seems to be scarce in the neighbourhood.
28. *Eupithecia distinctaria* H.S. 1.6.56 ♂. This should be frequent on Hutton Roof Crag, but I have not come across it here apart from this solitary specimen.
29. *Eupithecia succenturiata* (L.) 2.8.53 ♂. No obvious reason for this singleton.
30. *Eupithecia tenuiata* (Hübn.) 10.8.56 ♂. Chiefly associated with the mosses, as at Witherslack, 9 miles away.
31. *Dyscia fagaria* (Thunb.) 28.6.56 ♂. A peculiar record. Not common in the area, its headquarters must be on the mosses 9 miles to the west and/or the moors 8 miles to the north. No suitable habitats close at hand.
32. *Ennomos quercinaria* (Hufn.) 24.8.52 ♂. I now have doubts whether this was this species, though I had no doubt at the time, and I am perfectly familiar with it. Unfortunately the

specimen was not retained. The species is very scarce in this area.

33. *Cossus cossus* (L.) 18.7.52 ♂. No obvious reason for this singleton.

B. Species seen twice in the period 1952-6 *inclusive:*

1. *Pterostoma palpina* (Clerck) 9.6.53 ♂, 26.5.54 ♂. This should be more frequent.
2. *Cycnia mendica* (Clerck) 9.5.53 ♂, 26.4.55 ♂. This also should be more frequent.
3. *Amathes agathina* (Dup.) 5.9.56 ♂, 10.9.56 ♀. No suitable ground nearby. Colonies on the moors 8 miles to the north.
4. *Hadena serena* (Schiff.) 14.6.52 ♂, 22.6.56 ♂. This is not common in the area.
5. *Apamea scolopacina* (Esp.) 24.6.53 ♂, 9.8.53 ♂. This is also uncommon in the area.
6. *Dasypolia templi* (Thunb.) 20.9.55 ♂, 31.10.55 ♀. Very scarce in the area. See 1956, *Ent. Rec.* **68**:27 for notes on this interesting record.
7. *Leucania comma* (L.) 28.6.55 ♂, 4.7.56 ♀. This should be more frequent.
8. *Lithomoia solidaginis* (Hübn) 26.8.54 ♂, 4.9.56 ♀. Nearest known colonies on the moors 8 miles to the north. No suitable habitat nearby.
9. *Geometra papilionaria* (L.) 4.7.53 ♂, 20.7.55 ♂. Associated chiefly with the mosses, as at Witherslack, 9 miles away.
10. *Chesias legatella* (Schiff.) 3.10.53 ♂, 9.10.53 ♂. The nearest colony of broom—and with it this species—I know is 5½ miles to the north.
11. *Chloroclysta siterata* (Hufn.) 13.10.53 ♀, 29.10.53 ♂. I may have mixed a specimen or two with *C. miata,* which is very common and variable here, but these two are authentic. I suspect that it breeds nearby in very small numbers.
12. *Eupithecia lariciata* (Frey.) 20.5.54 ♂, 30.5.54 ♂. There are some larches about half a mile away, and it is not clear why this species was only seen in 1954.
13. *Eupithecia expallidata* (Doubl.) 4.7.53 ♀, 26.7.54 ♂. Not common in the neighbourhood.
14. *Gymnoscelis pumilata* (Hübn.) 21.7.52 ♂, 11.3.53 ♂. The apparent scarcity of this species here is unaccountable.

Distances given are in a direct line, not by road.

It is noteworthy that six of the above fourteen species provided both the specimens in the same year. Surely this points to a climatic reason—perhaps being the result of a strong wind in cases where the species appears to have come from a distance.

It is also noteworthy that the above lists show that 47 species out of a total of 322 species (Macros only) recorded at the trap from

1952-6 inclusive appeared only once or twice. This proportion, being almost exactly one-seventh, is quite unexpectedly high, and that is what has prompted the writing of this paper.

I am not at all sure that the above facts provide any useful evidence of the movements of moths, but nevertheless it seemed worthwhile to put them on record.

Hutton Roof Vicarage,
Westmorland.
24th January, 1957.

NOTE ADDED IN PROOF

Five more singletons were taken in 1957 in my Mercury Vapour Light Trap.

Panolis flammea (Schiff.) 13th March. A fresh ♂. Pine trees are in the Vicarage garden, so it perhaps breeds here in small numbers.

Macrothylacia rubi (L.) 15th June. A worn ♀. I had never seen any sign previously of this species nearer than the moors several miles away, but have seen one larva on Hutton Roof Crag this autumn—an offspring of the specimen which visited my light?

Hadena contigua (Schiff.) 11th July. A worn ♂. This species is thinly scattered over South Westmorland and is chiefly found in the well-wooded areas towards the west of the county. The nearest specimen I know of was captured at Staveley, fifteen miles away, by Dr. N. L. Birkett—a fresh ♂.

Hydraecia petasitis (Doubl.) 1st September. A fresh ♂. Occurs in the Kent Valley. The nearest butterbur of which I know is at least five miles away.

Omphaloscelis lunosa (Haw.) 20th September. A fresh but slightly crippled ♂. Occurs further south in Lancashire and has been reported from Furness, but is practically unknown in Westmorland. No explanation suggests itself for the occurrence of this specimen.

THE REV. J. H. VINE HALL.

THE FOOD-PLANTS OF *PYRAUSTA FUSCALIS* SCHIFF. (LEP: PYRAUSTINAE)—A CORRECTION

In Part II of the paper on *Pyrausta perlucidalis* Hübn. which appeared in the July, 1957, issue of the *Ent. Gazette* (Vol. **8**, No. 3), I inadvertently referred to *Pyrausta fuscalis* as an elder-feeder. This is incorrect, the food-plants of this species being cow-wheat (*Melampyrum pratense* L.) and yellow-rattle (*Rhinanthus minor* Ehrh.). The food-plant of *Pyrausta coronata* Hufn. (*sambucalis* Schiff.) is elder (*Sambucus*).

J. D. BRADLEY.

SOME FURTHER NOTES ON LEPIDOPTERA IN THE PUTNEY DISTRICT, WITH A LIST OF SOME FURTHER RECORDS

By H. D. SWAIN, F.R.E.S.

The Lepidoptera of the Putney district appear, during the last two or three seasons, to have diminished in the number of species which can regularly be expected to turn up in the M.V. trap, while at the same time some new records have been made to the tune of some seventeen species, though one of these is an old record dating back to 1912. Incidentally, there does not seem to be any obvious reason why *Colostigia multistrigaria* (Haw.) should have disappeared from Wimbledon Common, where it was found fairly commonly before the first war. Probably the reason why quite a few of the species I recorded in 1951 have not since turned up is that many large houses have been pulled down and blocks of flats have been erected in their place. This has led to the destruction of many trees, and, no doubt, to that of many insects which fed on them. At this moment I rather hesitate to give a list of disappearances, as I wish to make quite sure of the facts before anything is published. I am hoping that the coming summer may alter the outlook somewhat, since the last few years have not been good ones.

The short list of new records now follows.

CARADRINIDAE

**Amathes ditrapezium* (Borkh.). (1956.)
A. umbrosa (Hueb.). (1955.)
**Hadena conspersa* (Schiff.). (1956.)
**Bombycia viminalis* (F.).
**Arenostola pygmina* (Haw.).
**Citria lutea* (Stroem). (1955.)
Cirrhia gilvago Schiff. (1954.)
Cucullia umbratica (L.). (1955 and 1956.)
C. absinthii (L.). (1955.)
Procus latrunculus (Schiff.). (This is only just separated from a long series of *strigilis* (Clerck)). (1952 to 1956.)

GEOMETRIDAE

**Geometra papilionaria* (L.). (Larvae on birch, 1956.)

HYDRIOMENIDAE

**Colostigia multistrigaria* (Haw.). (1912.)
Euphyia cuculata (Hufn.). (1955.)
Ortholitha mucronata (Scop.). (1955.)
**Selenia bilunaria* (common in Wimbledon district).

PYRAUSTIDAE

Perinephela lancealis (Schiff.). (1955.)

GALLERIIDAE

Galleria mellonella (L.). (1956.)

It remains to add that the nomenclature is that given in Kloet and Hincks, 1945, *A check list of British Insects.*

Species marked with an asterisk were recorded by Dr. J. V. Dacie in the area of Wimbledon near the Common, and this is their first publication.

BOOK REVIEW

The Pursuit of Moths and Butterflies, by Patrick Matthews. An Anthology. 141 pp., 36 pls. (4 col.). 25.5 x 18.5 cms. Chatto & Windus, London, 1957. £1 10s.

This pleasant book, with its attractive illustrations, will appeal, I fancy, to other readers besides the lepidopterists for whom it might seem primarily intended. Anyone who likes reading about natural history, or looking at attractive scenes ranging from Manitoba to New Guinea, will enjoy these well-chosen extracts, all written in splendid prose and illustrated by excellent photographs, among which the four coloured plates are by no means the most striking.

The compiler, like Shelley, has 'gone into the fields to take what this sweet hour yields', in more senses than one. His net has taken writers as diverse as W. H. Hudson, Virginia Woolf, William Beebe and Vladimir Nabokov, but the one common quality among his writers seems to be that of enthusiasm and excitement—and what more is really required of a naturalist?

It is interesting to note how well the general articles were written in the *Entomologist's Record* and the *Entomologist* fifty years or so ago. It is a pity that this standard does not seem to have been maintained, but perhaps modern editors do not care very much for general articles. The women's contributions are also noteworthy. Fine writing is to be expected from Virginia Woolf, but Miss Cheesman and Miss Fountaine scarcely lag behind at all.

An anthologist may be said to have succeeded in his task if, as well as inducing a pleasant nostalgia among his readers, he also sends them back, or directs them to the originals. It would not be surprising if a number of people will be stimulated by Mr. Matthews's book to read further in the works of those authors (and others) to which he has pointed the way.

Finally, there is an index, but alas! the plates themselves are not numbered.

A. C. TOWNSEND.

RECORDS OF CYNIPIDAE (HYM.)

By S. A. MANNING, F.L.S., F.R.E.S.

This paper records the results of collecting done at various places outside Norfolk during the years 1951-56. When a place-name is first mentioned it is followed by the name of the county in which it occurs.

The Oak galls were found on the Pedunculate Oak, *Quercus robur* L. (= *Q. pedunculata* Ehrh.) except where the Sessile Oak, *Quercus petraea* (Matt.), is mentioned by name.

The nomenclature of the gall-makers is that of Kloet and Hincks (1945), except that *Adleria kollari* has been placed in the genus *Andricus* following the work of Marsden-Jones (1953).

Rhodites rosae (L.). 'Bedeguar' galls were found on Wild rose (*Rosa* sp.) at Ewhurst, Surrey, 4.x.1951; Southwick, Sussex, September, 1954; near Hertford, Hertfordshire, May, 1952. Examples of *Torymus bedeguaris* (L.) and *Orthopelma mediator* Thun., (= *luteolator* Grav.) emerged from the Hertfordshire material.

Rhodites sp. 'Smooth pea-galls' were present on Wild rose leaves at Ewhurst, 4.x.1951 (Several *Periclistus caninae* Htg., emerged); Lancing, Sussex, 20.ix.1952; Kingham, Oxfordshire, 22.vii.1956. 'Spiny pea-galls' were present on the same plant at Ewhurst, 4.x.1951; Haileybury, near Hertford, July, 1952.

Liposthenus latreillei (Kieffer). Galls were seen on *Glechoma hederacea* L., at Parham House estate, Sussex, 15.vi.1952; Lancing, 8.vi.1952; Shoreham-by-Sea, Sussex, 9.vii.1952; near Hertford, June, 1952; Kingham, 27.vi.1956.

Aulacidea hypochoeridis (Kieffer). Galls resembling those of this insect were present on stems of *Hypochaeris radicata* L., Ewhurst, 8.x.1951.

A. hieracii (Bouché). Mr. F. Schofield collected galls of this insect from stems of *Hieraceum boreale* at Elland, Yorkshire, 30.iv.1951. Examples of *A. hieracii* and of *Decatoma* sp. emerged from these galls.

Xestophanes potentillae (Retz.). Examples of this species emerged from galls on *Potentilla reptans* L., collected at Lancing, 10.v.1952; near Hertford, May, 1952; galls were found at Partridge Green, Horsham, Sussex, March, 1952 (collected by Mr. E. D. Wiggins); Kingham, 23.ix.1955.

Diastrophus rubi (Bouché). Galls were found on Bramble stems (*Rubus* sp.) at Ewhurst, September, 1951 (one *D. rubi* emerged); Shoreham-by-Sea, 17.v.1952.

Biorhiza pallida (Olivier). 'Oak apple' galls were found on Oak at Worthing, Sussex, October, 1952; near Hertford, May, 1952 (a few *B. pallida* emerged); Kingham, 13.v.1956.

Trigonaspis megaptera (Panzer) f. *renum* (Hartig). Galls on Oak leaves, Worthing, October, 1954.

Andricus testaceipes Hartig f. *sieboldi* (Hartig). 'Barnacle' galls were present on Oak twigs at Ewhurst, September, 1951 (several *Synergus incrassatus* Htg. emerged from these galls); Blythburgh, Suffolk, 27.v.1951.

A. quercus-radicis (Fabr.). What I took to be an old 'truffle' gall was found on a small Oak sapling at Ewhurst, September, 1951. An example of *Synergus reinhardi* Mayr was found in the packet with this gall, but Mr. J. Quinlan thought it was very doubtful if it was from the *A. quercus-radicis* gall. A 'truffle' gall was found at the base of an Oak, Kingham, 28.v.1956.

A. fecundator (Hartig). 'Artichoke' galls were found on Oak at Felpham, near Bognor Regis, Sussex, October, 1952; Harewood Park, near Leeds, 7.x.1956. They were present on *Quercus petraea* (Matt.) (= *Q. sessiliflora* Salisb.), Ewhurst, September, 1951.

A. ostreus (Hartig). Galls on Oak leaves at Henfield, Sussex, September, 1954; Kingham, 20.ix.1955; on leaves of *Quercus petraea* (Matt.), Ewhurst, September, 1951.

A. inflator Hartig. Galls on Oak near St. Olave's swing bridge, E. Suffolk, 18.iv.1952.

A. inflator f. *globuli* (Hartig). Galls in buds of *Quercus petraea* (Matt.), Ewhurst, November, 1951.

A. curvator Hartig. Galls on Oak leaves, near Hertford, May and June, 1952; Kingham, 19.v.1956; Harewood Park, near Leeds, 7.x.1956.

A. albopunctatus (Schl.). A new gall on Oak, Kingham, 12.v.1956.

A. seminationis (Giraud). Fusiform galls remaining on stems of male catkins of *Quercus petraea* (Matt.), Ewhurst, 4.x.1951.

A. quadrilineatus Hartig. Galls were present on male Oak catkins, Kingham, 3.vi.1956.

A. solitarius (Fonsc.). Galls on Oak, Ewhurst, October, 1951; Kingham, 13.v.1956.

A. kollari (Hartig). 'Marble' galls on Oak at Ewhurst, September, 1951 (1 *A. kollari* and 1 *Synergus* sp. emerged); near Hertford, May, 1952; near St. Olave's swing bridge, 18.iv.1952; Feltham, near Bognor Regis, October, 1952; Worthing, October, 1952, and October, 1954; Steyning, September, 1954; High Salvington, Sussex, September, 1954; Henfield, September, 1954; Harewood Park, near, Leeds, 7.x.1956; Kingham, 12.v.1956.

A. glandulae (Sch.). 'Thatched' galls on *Quercus petraea* (Matt.), Ewhurst, September and October, 1951.

Cynips quercus-folii L. 'Pale cherry' galls on Oak leaves at St. Olave's swing bridge, 18.iv.1952 (one *Synergus apicalis* Htg. emerged); Worthing, October, 1952; Steyning, September, 1954; Horsham, October, 1954; Ewhurst, October, 1951 (two *C. quercus-folii* found emerged on 23.xii.1951 after galls had been stored in unheated rooms); Kingham, September, 1955.

C. longiventris Hartig. Typical galls were found on the under-

surface of an Oak leaf (*Quercus ?petraea*), Ewhurst, September, 1951.

C. disticha Hartig. Galls were found on the undersurface of Oak leaves, Ewhurst, September, 1951. Some parasites (as yet undetermined) emerged from this material.

Neuroterus albipes (Sch.). New galls on Oak leaves, Kingham, 19.v.1956.

N. albipes f. *laeviusculus* Sch. 'Smooth spangle' galls on Oak leaves at Kingham, 20.ix.1955; Henfield and Steyning, September, 1954; Ewhurst, September, 1951 (both *Quercus robur* L., and *Q. petraea* (Matt.).

N. quercus-baccarum (L.). Galls on Oak leaves and male catkins, near Hertford, May, 1952 (Examples of *Torymus auratus* (Fourcr.) emerged from these galls). Galls on male Oak catkins, Kingham, 19.v.1956; galls on Oak leaves, Kingham, 28.v.1956.

N. quercus-baccarum f. *lenticularis* (Olivier). 'Common spangle' galls on Oak leaves at Henfield, September, 1954; Worthing, October, 1952 and 1954; Horsham, October, 1954; Shoreham-by-Sea, September, 1954; Angmering Park, Sussex, October, 1952; Ewhurst, September, 1951 (both *Quercus robur* L., and *Q. petraea* (Matt.)); near Hertford, July, 1952; Kingham, 20.ix.1955; Harewood Park, near Leeds, 7.x.1956.

N. numismalis (Geoff. in Fourcr.). 'Silk button' galls on Oak leaves at Henfield, September, 1954; Worthing, October, 1952; Shoreham-by-Sea, September, 1954; Horsham, September, 1954; Ewhurst, September, 1951; Kingham, 20.ix.1955; Harewood Park, near Leeds, 7.x.1956.

N. numismalis f. *vesicator* (Schl.). Gall--pustules on leaves of both *Quercus robur* L., and *Q. petraea* (Matt.), Ewhurst, September, 1951; new galls on Oak leaves, Kingham, 28.v.1956; Harewood Park, near Leeds, 7.x.1956.

Acknowledgments

I am very grateful to Mr. R. D. Eady, Commonwealth Institute of Entomology, and Mr. J. Quinlan, British Museum (Natural History) for kindly examining all the insects which emerged from the galls. Mr H. M. Russell is thanked for sending me a small collection of Oak galls from Harewood Park, near Leeds.

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249 The Avenues,
Norwich, Norfolk.
28th February, 1957.

OBSERVATIONS ON THE USES OF ATOMIC ENERGY IN ENTOMOLOGY

By R. F. AITKEN

The advent of the nuclear fission bomb with its subsequent release of electromagnetic radiation in the form of gamma rays, and the hazardous biological effects suffered by organic bodies to their cell structures, has been reported extensively, both in popular and scientific publications.

The application of radiation to entomology can be categorically placed under two broad headings, viz.: (i) Controlled irradiation in organized experiments, where the quantum is known and the results observed, and (ii) uncontrolled irradiation released from thermo-nuclear explosions, with possible long term biological changes.

At present the study is mainly economic, and some research centres have already conducted experiments in biological control of insect pests. One, notably, was the sterilization of large numbers of a specific variety of fly which was subsequently released, and so swamped the natural colony that very few fertile eggs were produced. The benefits of this method is specificity, which cannot be obtained with ordinary insecticides that kill indiscriminately. The progress of wood boring and various soil burrowing insects has been investigated with the use of radioactive trace elements, the passages through the media being easily traced by an instrument especially manufactured to record the radiations emanating from the prepared subject. It has been suggested that migration flights could be plotted by this means.

It is known that the insecta are capable of withstanding large doses of gamma radiation, without harmful effects, and which are far in excess of that possible by the mammalia. Certain insects can absorb something like 100,000 rads (the rad is a unit of radiation dose corresponding to an absorbed energy of 100 ergs per gram of the irradiated material) before total destruction. Homo-sapiens on the other hand can absorb only 6-800 rads, which is sufficient to cause death if applied over the whole of the body.

Some interesting and approximate comparisons on the amounts and effects of radiation absorption by various orders is given in the following table:

Rads (Appx.)	Insects	Plants	Mammals
0–200	——	——	Sterility
200–1,500	——	Some Mutations	Serious damage, Extermination
1,500–10,000	Mutations, Sterility	Damage, Mutations	——
10,000–100,000	Serious damage, Extermination	Serious damage, Extermination	——

The eradication by irradiation of harmful insects from many stored food products (particularly grain) has been contemplated as a substitute for normal disinfestation methods, and where injury does not occur to the stored materials the saving would be considerable.

In considering the applicability to entomological operation, the possibilities exist for utilizing electromagnetic radiation to help resolve many of the problems associated with the economics and physiological aspects of the science. It is hoped that the release of this information will be made available to interested entomologists as greater knowledge and improved techniques are developed.

The above is a brief general resumé of some recent published articles dealing primarily with industrial, horticultural, and nuclear energy subjects, but not specifically entomological, and it is hoped that readers better qualified than the writer will continue to contribute data which will enable us to keep up to date on this recent interesting application to the science of entomology.

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Ewhurst, Cranleigh, Surrey.
17th April, 1957.

COSYMBIA PUPPILLARIA (HÜBN.) AB. *BADIARIA* STGR. IN BUCKS. (LEP: GEOMETRIDAE)

On 25th September, 1957, I took a fine ♀ *Cosymbia puppillaria* (Hübn.) ab. *badiaria* Stgr., at light at Chalfont St. Peter. This is, I think, the first time this moth has been seen in Bucks. The specimen is of a uniform fulvous colour with very little trace of markings except a conspicuous black dot with a white centre on each wing.

SIR ERIC ANSORGE.
'Timbers', Welders Lane,
Chalfont St. Peter, Bucks.

AN OCCURRENCE OF *PAPILIO PODALIRIUS* L. IN DEVON (LEP: PAPILIONIDAE)

I beg to record that while examining the collection of Dr. Lilian Tracey, of Salisbury, on 1st October, 1957, I came across a small ♂ specimen of the Scarce Swallowtail taken by her father, Dr. H. E. Tracey, at Willand, Devon, in May, 1895. It still bears the label, in the captor's writing, giving these particulars, and there is not the slightest doubt as to the specimen's authenticity as a genuine immigrant.

I. R. P. HESLOP.
'Belfield', Burnham-on-Sea,
Somerset.

NOTES ON THE IDENTIFICATION OF TIPULA LARVAE (DIPTERA-TIPULIDAE)

PART I

By ALLAN BRINDLE, F.R.E.S.

The recent excellent publication on the above subject by Chiswell (1956) enables the Dipterist to name 25 species of the larvae of the genus Tipula by using characters afforded by the anal segment.

The characters given for the larva of *T. subnodicornis* Zett., which were based on a description by Beling (1886) are not correct, and a description and drawings of the anal segment of this larva are given in this present paper. Chiswell points out that some of the species described by Beling were misidentified, and *subnodicornis* is apparently one of these. The larvae of this species have been bred out over the past two years, from three localities, and the larvae are sufficiently distinctive to be readily recognizable under a hand lens. The only other larvae which bear some resemblance to them are the larvae of *T. macrocera* Zett., which occur in similar habitats and at the same time of year. This larva is also figured and described in this paper.

A paper by Savienko, which appeared in the Russian Zoological Journal (1955) illustrated the anal segments of eighteen species of Tipula larvae occurring in Britain, and amongst these six species were shown which were not figured by Chiswell. These are: *nigra* L., *nubeculosa* Mg., *obsoleta* Mg., *signata* Staeg., *truncorum* Mg., and *luteipennis* Mg.

In this present paper the following species of larvae are figured and described shortly: *subnodicornis* Zett., *macrocera* Zett., *staegeri* Niels, *signata* Staeg., *luteipennis* Mg., *paludosa* Mg., and *oleracea* L. The first three species do not appear to have been described or figured before; *signata* is included for comparison with *staegeri*; *luteipennis* is included to comment on the peculiar structure of the anal segment; *paludosa* and *oleracea* are included to comment on a curious difference between the anal papillae of these two larvae.

Tipula subnodicornis Zett.

The occurrence of the adult of this species amongst cotton grass has naturally led to the suggestion that the larvae are to be found amongst the roots of this plant. This appears to be rarely the case, at least in this area. Only one larva has been found by shredding the roots of cotton grass, but many larvae and pupae have been found by searching such moorland mosses as *sphagnum, polytrichum,* and *hypnum.* They appear to be in the soil under *polytrichum,* and can be found by pulling up the moss plants, but they occur in the moss itself in *sphagnum* and *hypnum.* Full grown larvae are found in early April.

When full grown the larvae measure about 19 mm. in length and about 2.5 mm. in thickness, and vary in colour from a very pale brown to a grey. When of a grey colour the dorsal surface is darker, and in some cases a definite pattern is to be seen along the lateral and dorsal surfaces (Fig. 2). This pattern may be restricted to the posterior segments or may be absent, resulting in an unicolorous larva.

The anal papillae are arranged in four pairs (Fig. 3), each about equal in length. The papillae taper very slightly towards the tip.

The anal segment has six lobes, each margined by short hairs (Fig. 1—hairs on ventral lobes omitted). The surface of the lobes is sclerotized, of a reddish-brown colour, and darkened along the margin of the lobes with a clear area at the tip. A brown patch occurs to the inside of each spiracle. The spiracular border is usually bluish.

The ventral lobes (Fig. 14) show much the same markings as the dorsal and lateral lobes.

Indeterminate markings occur in spots along the edge of the anus and other parts of the anal segment, but these are not constant.

The pupa of this species appears to be unusual in having very short respiratory horns (Fig. 20). This pupa varies in colour and a pattern of varying degree of prominence can sometimes be seen along the lateral surface.

The pattern of the larvae, where present, appears to be due to actual pigmentation of the cuticle and not to bands of short hairs as in the case of the larva of *luteipennis*.

Tipula macrocera Zett.

The larva, rather larger than that of *subnodicornis,* measures about 22 mm. in length and about 3 mm. in thickness, and varies in colour. Usually of a grey colour, similar in shade to that of *subnodicornis,* it can be green, due possibly to the nature of the food. It appears to be confined to *hypnum* moss as far as this area is concerned, in wet places on moorland. Full grown larvae are found in April.

The anal papillae are in four pairs, but are more conical than those of *subnodicornis,* and the tip is appreciably narrow. This tip appears to be longer with the anterior four papillae than in the posterior ones (Fig. 6).

The anal segment has six lobes, margined with short hairs (Fig. 4 —hairs on ventral lobes omitted). Each lobe has the entire surface sclerotized, of a reddish-brown, and with a dark line down the centre. Markings on the disc may occur but seem to be inconstant. The spiracular border is dark brown.

The ventral lobes (Fig. 15) show much the same markings as the dorsal and lateral lobes.

Tipula staegeri Niels.

The larva measures about 20 mm. in length and 3 mm. in thick-

ness. It occurs in moss on stones, walls, etc., usually in damp places —woods, by streams, etc. The colour is grey, lighter on the ventral surface.

The anal papillae show a curious similarity to those of *macrocera.* They are conical with a narrow tip, and this tip is longer in the anterior four than in the posterior four. (Fig. 9.)

The disc of the anal segment (Fig. 7) is closely similar to that of *marmorata,* from which is may be distinguished by

(a) the longer anterior papillae;
(b) the irregular markings to the inside of the spiracles;
(c) the form of the marking to the exterior of the spiracle—this resembles a hook in *staegeri* but is straight in *marmorata*;
(d) the different markings on the ventral lobes (Fig. 13). This has a resemblance to the marking of *marmorata* but is darker and more extensive.

Tipula signata Staeg.

This larva occurs in the same habitats as that of *staegeri,* which it resembles closely. The points of difference appear to be:

(a) the anal papillae are all equal in length.
(b) The markings to the inside of the spiracles are different. (Fig. 18.)
(c) The markings of the ventral lobes are much darker, being almost black in some specimens. (Fig. 19.)

Both *signata* and *staegeri* may be separated from *marmorata* by the markings to the outside of the spiracles which appears in the form of a hook.

It is uncertain at this stage how much reliance can be placed on the shape and size of these areas of darker colour—the areas of sclerotization. In the larvae of *staegeri* and *signata* I have examined the markings to the outside of the spiracle vary slightly, but all have the hook-like appearance more or less well defined, sufficient to distinguish them from specimens of *marmorata.*

Within the *marmorata* group itself there are *marmorata, obsoleta,* and *alpium* Bergr., which are very similar to each other. According to Savienko, *obsoleta* can be distinguished from *marmorata* by the markings to the inside of the spiracles, which form a pair of very small squares, and the lateral lobes are extended upwards into thick papillae-like protuberances. The latter character, to a less extent, he shows in *signata.* This I have not seen.

Alpium appears to be indistinguishable from *marmorata* on the characters of the anal segment, for, although the markings to the inside of the spiracles differ, these do not seem sufficiently constant to warrant any reliance being placed upon them.

The markings of the ventral lobes of all the above species are closely similar, differing chiefly in the degree of sclerotization and in the extent of it.

It is also uncertain how much reliance can be placed on the shape and size of the anal papillae. Although the larvae I have studied have been treated in the same way as outlined by Chiswell, the anal papillae are not always fully extended. The *marmorata* group have all four pairs of papillae, mostly all equal in size. It seems strange thus that *staegeri* should have the anterior four longer than the posterior four, when its relative, *signata,* has them all equal. The habitats are similar. It would seem to be equally strange, however, if the four anterior were fully extended and the four posterior ones were not, due to preservation. The distinguishing features outlined above, therefore, should be accepted as being tentative only.

A further point regarding the anal papillae is of some interest. During August, 1956, I obtained several larvae from submerged moss (*Fontinalis*) in the outflow of Malham Tarn. From these emerged a series of *Tipula oleracea* L., which were totally unexpected. Further series of larvae were obtained and bred out to check on the identification. Specimens of the adults have been sent to Mr. P. Freeman at the British Museum, and the identification is confirmed.

Apart from the unusual habitat, the anal segments of these larvae show a decided difference from the anal segments of *paludosa.* Both anal segments are shown in Figs. 16, 17—it will be seen that the larvae of *oleracea* have four thick papillae. All authorities state that the anal segments of *paludosa* and *oleracea* are indistinguishable.

It may be assumed that this is correct, for Chiswell has bred both species from the egg, and the distinction between the adults of these closely similar species is now well known.

This, however, suggests that this particular race of *oleracea* has developed extra papillae—possibly on account of the curiously different habitat. It also suggests that the characters of the anal papillae are not therefore entirely reliable.

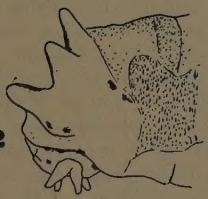
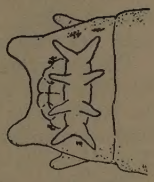
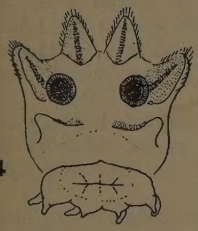
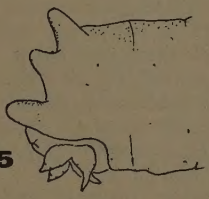
The larvae breed freely in the moss, both on vertical walls, with water running down, and in the moss on stones in the stream itself. Pupae have been found protruding from the moss on the walls. The emergence of the adults from the moss on the walls is understandable, but the fate of the larvae in the moss on the stones in the stream itself is uncertain. The bed is sandy, the current swift, and the only route open to the larvae is to, presumably, allow themselves to be swept by the current to the bank, where they would be able to pupate in comparative safety.

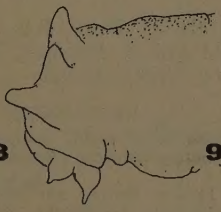
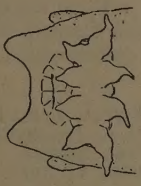
The abundance of the larvae this particular year may be due to the very dry summer of 1955, when very little water came down the outflow.

It is hoped to study this peculiar habitat again this year.

Tipula luteipennis Mg.

The larvae occur in marshes under standing water, and show a striking resemblance to those of *Prionocera.* They measure up to

LAST ABDOMINAL SEGMENT OF TIPULA LARVAE

Figs. 1-9. *Tipula subnodicornis* Zett. (1) Posterior view. (2) Lateral view. (3) Ventral view. *T. macrocera* Zett. (4) Posterior view. (5) Lateral view. (6) Ventral view. *T. staegeri* Niels. (7) Posterior view. (8) Lateral view. (9) Ventral view.

40 mm. in length with a thickness of between 3 and 4 mm., and are whitish in colour, at first sight appearing rather like the larvae of *Pedicia rivosa.* They are, however, often tinted a light yellowish-brown if the water contains iron oxide. They are curiously limp when handled, presumably due to a thin or very flexible cuticle. They are very common in such habitats during August.

The anal gills are six in number, four of which are equal in size, the other pair being smaller, and all are placed anterior to the anus, the latter being ventral in position (Fig. 12). A slight pattern, due to short blackish hairs, often occurs towards the posterior segments (Fig. 11). The spiracles are large, the borders dark brown.

The lobes are yellowish-brown, like the disc, and with darker margins. The latter are incomplete on the upper side of the lateral lobes and the inner side of the ventral lobes (Fig. 10). Each lobe is margined with long hairs, not shown on the ventral lobes in Fig. 10, but these are not so close together as in *Prionocera.* The lobes also are much thicker in *luteipennis* than in *Prionocera.* Otherwise the anal segments of these two larvae show a close resemblance (cf. Chiswell, Figs. 40 and 41, p. 434).

All drawings were made with the aid of a camera lucida, and the marginal hairs on the lobes are shown only on the drawings of *subnodicornis* (Fig. 1), *macrocera* (Fig. 4), and the three drawings of *luteipennis* (Figs. 10-12).

It is hoped in a further paper to outline other characters to distinguish certain closely similar larvae. At present, for instance, there is nothing to distinguish between the larvae of *lateralis* Meig., *couckei* Tonnoir, and *montium* Egger, all of which have very similar larvae.

I wish to thank Mr. D. Bryce, B.Sc., for the loan of larvae of *Tipula staegeri,* and Mr. P. Freeman, M.Sc., for the checking of the determination of *Tipula oleracea.*

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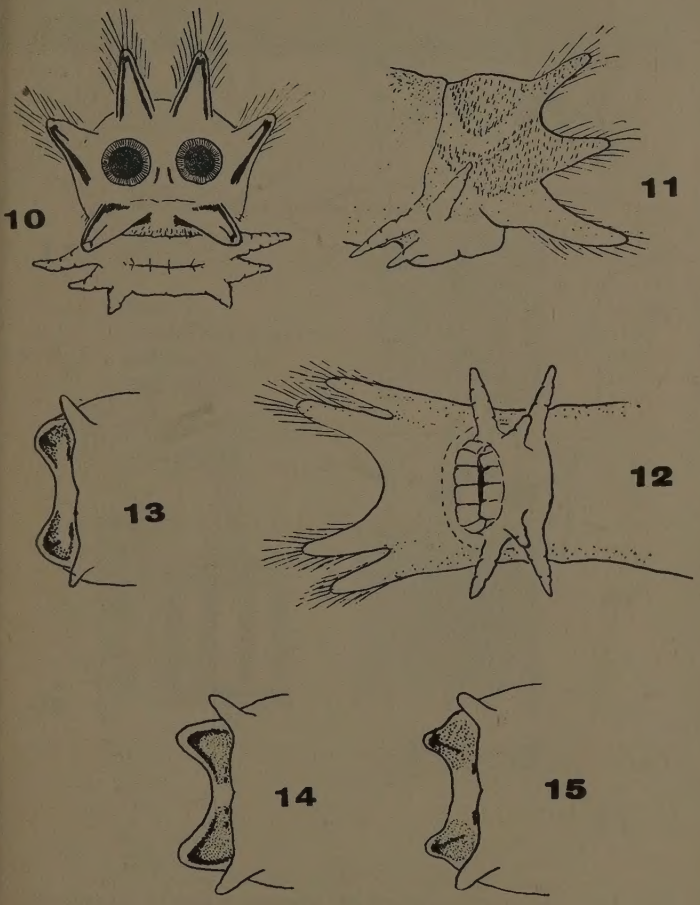
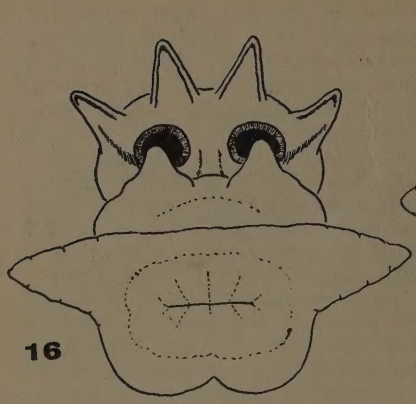
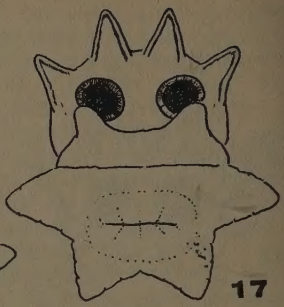
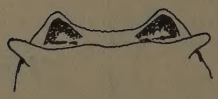


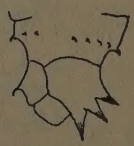
LAST ABDOMINAL SEGMENT OF TIPULA LARVAE

Figs. 10-15. *Tipula luteipennis* Mg. (10) Posterior view. (11) Lateral view. (12) Ventral view. *T. staegeri* Niels. (13) Dorsal view. *T. subnodicornis* Zett. (14) Dorsal view. *T. macrocera* Zett. (15) Dorsal view.









LAST ABDOMINAL SEGMENT OF TIPULA LARVAE AND PUPA

Figs. 16-20. *Tipula paludosa* Mg. (16) Posterior view. *T. oleracea* L. (17) Posterior view. *T. signata* Staeg. (18) Posterior view. (19) Dorsal view. *T. subnodicornis* Zett. (20) Pupa.

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